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The Hunterian Oration

ON THE

INFLUENCE EXERTED BY THE MILITARY EXPERIENCE OF JOHN HUNTER ON HIMSELF AND THE MILITARY SURGEON OF TO-DAY.

Delivered before the Royal College of Surgeons of England on Feb. 14th, 1917,

BY SIR G. H. MAKINS, F.R.C.S. ENG., K.C.M.G., C.B.,
SURGEON-GENERAL, A.M.S.

MR. PRESIDENT AND GENTLEMEN,—This day 189 years ago witnessed the birth of John Hunter. Since the year 1814 it has been customary for a member of the Council of this College to deliver at stated intervals an address recalling the memory of that illustrious man. The speakers on these occasions have in turns devoted the short space of time at their disposal to either a philosophical disquisition, an attempt to form an estimate of the influence exerted by Hunter on the surgical thought of his time, or to dwell upon some portion of the writings he has left us. My own powers are unequal to the first task, while my knowledge of the state of surgery as Hunter found it is too limited to allow me to essay the second. I therefore propose to deal briefly with his work as a military surgeon, and to try to show what influence this may have had on his successors and upon himself, and how far the views which he held and taught deviate from those which guide the military surgeon of to-day.

I think the divergence is not a very wide one, for although some of the most modern surgical practice has been spoken of as a *revolution*, yet the general tendency has rather been in the direction of a *reaction*. I believe that this reactionary character has been as striking in the surgery practised during the present war as it has been in the military methods employed. I may instance the return to the direct transfusion of blood, the performance of excision of joints in the early stage of acute arthritis, the extensive operations for head injuries, and the character of the methods of wound treatment advocated by some; even in the case of the chief triumph of recent military surgery, operations for injury of the hollow abdominal viscera, the advance has depended rather on the favourable conditions furnished by the nature of the warfare than on any change in surgical principles.

HUNTER AS MILITARY SURGEON.

Of John Hunter's actual life and doings in the field we know little. In the year 1760 he went as surgeon on the staff to Belleisle and Portugal, his term of active service amounting to two years, while in 1790 he was appointed Inspector-General of Hospitals and Surgeon-General of the Army. It is, perhaps, not astonishing to find that not a small share of the meagre correspondence at our disposal is devoted to matters regarding promotion, pay, the character of his seniors, and the social qualities of his colleagues. The world and military life have, no doubt, altered but little in these respects.

With the exception of his own writings, nothing remains of the surgical history of the wars in which he took part. This is to be explained by the fact that the wounded men were transferred on board ship as quickly as possible and sent to England. Hence Hunter, as is the case with his successors of to-day, was afforded but small opportunity of following out the complete history of the majority of the patients who may have come under his care. His own brief mention of his work is characteristic enough; he says in one of his letters [1]:—

"Thank God I have succeeded in everything I have attempted, but my practice in gunshot wounds has been in a great measure different from all other, so that I have had the eyes of all the surgeons upon me, both on account of my supposed knowledge and method of treatment."

How far Hunter's immediate colleagues agreed with his opinions and practice it is impossible to tell, but that his influence at a later date was great is evident from the comments of the next great military authority belonging to our own College. Mr. Guthrie says [2]:—

"Hunter served for a few weeks in 1761 at the siege of Belleisle, and it is much to be regretted that his opportunities were not sufficiently numerous to enable him to draw such inferences from them as would have left but little to desire. The greater part of what he did leave was from this cause found not to accord with the observations made by his successors, while the prestige attached to his name was so great, as much to impede their progress on many essential points."

An examination of Guthrie's writings does not, however, appear to afford much support to this statement, except in so far as Hunter's disinclination to perform either primary or intermediate amputations is concerned. We shall perhaps do better therefore to examine shortly for ourselves the material which Hunter left behind him, and judge how far his opinion and teaching differ from those of to-day. While, however, confining ourselves for the most part to the two lectures especially devoted to "The Treatment of Gunshot Wounds," we must bear in mind that Hunter states that his "extensive opportunities of attending to gunshot wounds" drew his attention to the subject of "inflammation in general" and enabled him to make observations which formed the basis for his "Treatise on the Blood and Inflammation."

HUNTER'S WRITINGS ON GUNSHOT WOUNDS.

The two lectures on "The Treatment of Gunshot Wounds" differ considerably in character from the series devoted to general surgery. They are more simple and direct, less overlain by theory, and consist for the most part of clinical observations and practical instructions. Perusal of them furnishes some support to Guthrie's criticism, in that the illustration of some of the statements made is found in descriptions of cases met with at a later date in civil practice. An equally satisfactory explanation of this occurrence is, however, offered by the fact that for these lectures, as in all Hunter's writings, the material on which they are based was collected many years before the time at which it was utilised for publication.

In the second lecture devoted to gunshot injuries of the special regions of the body little is included which is not equally applicable to the subject to-day. In dealing with the subject of injuries to the head Hunter belonged to the active school—any injury appeared sufficient excuse for trepanning the skull. He dwells on the necessity of raising a sufficiently extensive flap to allow of proper exploration of injury to the skull, and speaks of the propriety of incising the dura mater in some instances. With regard to the latter procedure, however, he says: "Whenever I have seen the dura mater opened, the brain has worked through the opening, and the patients have died" (i., 495); hence he recommends caution.

The favourable prognosis attendant upon wounds of the chest is recognised, also the importance of collapse of the wounded lung in restraining primary hæmorrhage and the tendency of the blood effused into the pleural cavity to clot (iii., 353). Hunter made a number of experiments on the production of pneumothorax, &c., on dogs, and recommends "the operation for the Empyæma" in cases of hæmothorax. It does not appear, however, whether he ever performed this operation.

In the section on injuries to the abdomen the expectant method of treatment is imposed, and this perhaps especially because Hunter was familiar with the favourable course which followed the formation of a secondary fæcal abscess and fistula when the colon has been injured. In the matter of diagnosis no great advance has been made since his time, except that dependent on the use of the X rays in localising the seat of foreign bodies. The value of localised pain and tenderness as a diagnostic aid is dwelt upon, also the various hæmorrhages as signs indicative of injury to special viscera. Again, it is interesting to notice that he dwells upon the absence of any certain sign denoting injury to the spleen, also the fact that either the spleen or spleen and liver may be wounded without any obvious adverse result. The often re-discovered fact that there is little tendency for the contents to escape from a wound of the

[1] S. Paget: Life of John Hunter, p. 75.

[2] Guthrie: Commentaries on Surgery, p. 5.

small intestine was also impressed by Hunter. In view of the modern treatment of septic peritonitis it is instructive to note that the suggestion is made of placing the patient in a tepid bath in order to supply fluid to the general constitution. Directions for treatment consist, however, mainly in instruction of how to deal with the secondary consequences of injuries to the abdominal viscera; as to primary lesions he says: "I should suppose the very best practice would be to be quiet and do nothing, except bleeding, which in cases of wounded intestine is seldom necessary."

Conservatism is impressed in the matter of primary removal of bone fragments in gunshot fractures and the too early interference with sequestra. Hunter, in fact, takes the same line in dealing with these, as he lays down in the case of retained missiles. "In general there can be no better way of coming to a part or extraneous body than by waiting for the formation of an abscess there."

The one point on which Hunter's immediate successors appear to differ most freely from him, is as to the line to be followed when an amputation has to be considered. He says, "I have already observed that few can support the consequences of the loss of a lower extremity when in full health and vigour"; hence he avoided primary amputation whenever possible, condemned operations of an intermediate nature, and preferred those of the secondary class.

We may now pass on to the question of the treatment of gunshot wounds in general, dealt with in the first lecture and throughout the whole "Treatise on the Blood and Inflammation."

WOUND TREATMENT.

Hunter's methods of treatment were guided by the views held by him on the pathology of the healing of wounds, and these methods were limited in consequence of his ignorance of the part played by infection as a cause of inflammation. Hence he is not concerned to differentiate between the process of repair and that of inflammation. He says:—

"The injury done has in all cases a tendency to produce both the disposition and the means of cure. The stimulus of imperfection taking place immediately calls forth the action of restoration" (iii., 239), yet "injuries often excite more action than is required" (iii., 260). Then inflammation is excessive, and this "may arise from a vast variety of causes with which we are at present unacquainted; nay, which we do not perhaps even suspect" (iii., 407).

While he regarded suppuration as an unavoidable consequence of many wounds, yet he says "suppuration may be considered a resolution, but it is the mode of resolution we commonly wish to avoid" (iii., 369). Hence his attempts to diminish the degree of general reaction by blood-letting, and locally to effect an immediate closure of the wound. "In parts which have been divided and exposed the inflammation is in great measure prevented by bringing them together" (iii., 369), and when this cannot be done, "Nature attempts to prevent inflammation by covering the wound with blood and forming an eschar." Thus a power of resolution is shown "even in cases where the parts have been exposed."

It is of interest in this relation to recall that he combats the opinion promulgated by A. Paré and held long after that exposure to the air was in itself a cause of suppuration. "Exposure to air certainly has not the least effect on parts exposed, for a stimulus would arise from a wound even were the part contained in a vacuum." Air takes no part in the formation of an abscess, cellular emphysema is not attended by suppuration, the air itself in a pneumothorax is not a source of danger, nor is air necessary for the development of a gonorrhœa.

In describing the special characteristics of gunshot wounds, contusion is the feature upon which he lays most stress (iii., 545). He observes that the degree and extent of the contusion vary inversely with the velocity retained by the missile. Thus, the greater the velocity retained by the ball, the cleaner it wounds the parts, yet they slough; if the velocity is low the mischief is less and the ball more easily deflected. If the velocity be high, blood-vessels are divided instead of being contused; if it be very low they are torn.

The contusion of the tissues and the resulting slough prevent healing by the "first intention," "from which circumstance most of them must be allowed to suppurate" (iii., 543). Hunter observed that the tissue devitalised by contusion temporarily protected that lying beneath, and hence the advent of inflammation (infection) was retarded, an observation which still retains its force in the case of more modern projectiles. Hunter deprecates the practice handed down from A. Paré and Wiseman of routine enlargement of gunshot wounds, and ascribes its origin to anxiety on the part of the surgeon to remove a foreign body. He then points out the difficulty often accompanying the attempt to extract foreign bodies, the fact that experience had shown that these might be left without evil consequences, and concludes that the custom of opening up wounds had been continued in ignorance of its primary object. He does not appear to have realised that the practice afforded an advantage not properly appreciated of affording drainage to an infected area.

Still, the rule "that it should not be opened up because it is a gunshot wound, but because there is something necessary to be done which cannot be executed unless the wound is enlarged" (iii., 549) is sound enough, as also the statement "this is common surgery and should be military surgery respecting gunshot wounds" (iii., 550), and is certainly to be preferred to that of Baron Percy enunciated so late as 1792, "the first indication is to change the nature of the wound as nearly as possible into an incised one."

Hunter, however, improperly undervalues the argument that enlargement of the wound takes off the tension arising from the inflammation because he considered inflammation a necessary consequence of gunshot wounds, and "any increase in the size of the wound was to be considered as an extension of the first mischief, and must be supposed to produce an increase of the effects arising from that mischief" (iii., 552).

He then proceeds to enumerate a number of conditions which call for enlargement of the wound which obviously hold good to-day; but "if none of these circumstances has happened I think we should be very quiet." Nevertheless, he recognised the danger of a contour wound and recommended an incision over the centre, or the laying open of the entire track, to avoid the danger of abscess formation and the occurrence of extensive suppuration—a danger not always appreciated as it should be in dealing with contour wounds of the head, chest, and abdomen even to-day.

LOCAL TREATMENT OF THE WOUND.

"The injury done has in all cases a tendency to produce both the disposition and the means of cure. The stimulus of imperfection taking place immediately calls forth the action of restoration" (iii., 239).

"The first and great requisite for the restoration of wounded parts is rest, as it allows that action which is necessary for repair to go on without interruption" (iii., 260).

In these two axioms we find the theory upon which Hunter's treatment of wounds was based. The dominating factor in the healing of the wound he held to be the vital process or action of the body, a principle dwelt upon in equal measure by his great successor Lister, and one to which, perhaps, too little attention is given even to-day by the originators and advocates of various local methods of wound treatment.

He drew little distinction between the process of repair and that of inflammation, regarding both as the consequences of an "operation" in which the blood-vessels took the major share, since in the state of knowledge then existing he was ignorant of the important part taken by increased activity of the fixed tissue element in addition. Again, his ignorance of the common dependence of inflammation on infection hampered him in devising any local form of application to the wound. Hence we find him mainly occupied with discussing the relative merits of a cold- or hot-water dressing and the advantages to be obtained by the use of the poultice which required to be less frequently reapplied, and could be removed more easily and with less pain to the patient.

Regarding the healing of a wound as a natural "vital operation" Hunter saw no greater mystery in this process than in the growth and development of the infant to the man. So to-day, in apportioning its relative value to any special form of wound treatment, we must bear in mind that it is difficult, aye, impossible, to prevent the healing of a wound, much as the process may be interrupted or distorted by extraneous causes.

WOUND TREATMENT IN THE PRESENT WAR.

During the past two years the local treatment of gunshot wounds has given rise to as lively and ardent discussion as that accompanying the introduction of the antiseptic principle by Lister during the earlier part of the last half-century. It appears as if the steady development of the "aseptic

principle" and its obvious success in civil practice had lulled the modern surgeon into a happy dream, from which he was suddenly awakened to the terrible spectacle of wounds infected in a proportion and to a degree to him almost incredible.

"As a ship which passeth over the waves of the water, which when it is gone, the trace thereof cannot be found, neither the pathway of the keel in the waves."

So, indeed, the experience of the pre-antiseptic surgeon seemed to have vanished and left no trace in the minds of men. This is perhaps the less remarkable in that the simple wounds inflicted by the bullet of small calibre in recent wars had proved themselves of little consequence in affording either a ready pathway for the entrance of infection or a fertile ground for its extension.

The antiseptic measures suited to meet the limited demands attendant on the practice of aseptic surgery, and in which trust was at first reposed, proved impotent when applied to the treatment of the severe and grossly infected wounds produced by the altered forms of missile employed in the present warfare. This disappointing experience was followed by a brief acute reaction in the direction of attempting an immediate and complete primary sterilisation of the wound by the application of powerful antiseptic media such as liquefied carbolic acid and strong solutions of mercurial salts.

It appears strange that attempts at complete primary sterilisation of the wounds should have found so much advocacy. No surgeon has ever succeeded in procuring immediate sterilisation of extensive infected areas of tissue by chemical media, and the striking statement made by Lister on this subject seemed to have been completely forgotten.

"If, for example, a pair of forceps is handed to the operator with the intervals between the teeth occupied by dry septic pus, and a portion of this dirt becomes detached and left in the wound, the evil cannot be corrected by any antiseptic wash that is now at our disposal or that the world is ever likely to see."[3]

This being Lister's view regarding the ill-effects liable to follow the detachment of a few particles of infective matter from the teeth of a forceps, we may readily assume what his opinion would have been as to the feasibility of complete primary sterilisation of gross infection dependent on the passage or impaction of fragments of shell and dirty clothing.

The complete failure of attempts at effective primary chemical sterilisation led to increased resort to mechanical cleaning of the wound by removal of devitalised and infected tissue by the knife and scissors, and to the employment of counter incisions for drainage, both to prevent extension of the infection and to effect a cure. These procedures have remained measures of primary importance whatever subsequent method of treatment may be adopted.

Bacteriological investigation of gunshot wounds during the process of healing has shown that whatever method of treatment may be adopted, a certain primary sequence of bacterial growth and development is maintained.

Examination of "smear" preparations taken during the first 12 hours reveals the presence of no organisms although cultures prove positive. This incubation stage is followed by the appearance first of micrococci and a highly varied flora of other organisms. These latter in a properly drained wound tend to die out rapidly, and in the course of five or six days micrococci alone may persist. This is the crucial period for the completion of sterilisation, and success depends on two factors: (*a*) the vitality of the natural process and (*b*) the efficiency of the method of treatment adopted.

As to the first factor, in a certain proportion of instances the vital powers will suffice, but in a considerable number either the primary reaction is deficient, the infection too gross to be efficiently dealt with, or the infection regains ascendency when the initial reaction commences to fail in power.

Determination of the degree of activity and efficiency of the vital powers in any given case is impracticable, hence some general plan of treatment must be adopted for all. Opinion has been to some extent divided as to the most desirable method, and the chief differences have arisen in connexion with the antiseptic system as laid down by Lister, and the physiological or phylacagogic system of Wright.

The question obviously resolves itself into that of the secondary sterilisation of wounds: in the one method an attempt is made to supplement the natural vital powers from without by the employment of chemical media to inhibit or destroy bacterial growth in the wound; in the second an attempt is made to modify and strengthen the vital powers by the local application of a simple physical process.

Secondary Sterilisation of Wounds: Chemical Antiseptic Methods.

In proceeding to a consideration of the comparative value of these two methods from the point of view of the surgeon it is well to first inquire what is to be hoped for by the use of chemical antiseptic media. Lister proved beyond any possibility of doubt the absolute efficiency of such media as prophylactic or preventive agents, yet both his teaching and writings indicate that he viewed the question of dealing with an established infection from an entirely different standpoint. Of this no better illustration can be found than in the sharp distinction which he drew between "bactericidal" and "inhibitory" media and the way in which he employed them respectively.

We may first ask is it possible by chemical means to effect the sterilisation of tissue lying beneath the surface of the wound? It has not been proven that any chemical antiseptic can penetrate the tissue in sufficient quantity or to a sufficient depth to exercise bactericidal powers, unless it is at the same time sufficiently powerful to damage or destroy the tissues themselves. As in other methods the deeper tissues must depend upon the vital process for sterilisation, or, as Lister terms it, the coöperation of the "natural antiseptic"—i.e., the constituent parts of the blood.

Before leaving this part of the question we may also ask whether a complete clearance of organisms from the tissues deep to the surface of the wound is a necessary preliminary to closure of the cavity. This question may be answered in the negative. Evidence is offered by the common observation that many wounds the surfaces of which are free of organisms may be safely and definitely closed if the surface be not disturbed or injured in the course of the operation, while others in which disturbance of the surface is necessary for the completion of the operation often flare up with a fresh infection. Moreover, the safety with which a serous cavity such as the peritoneal may be closed in the evident presence of a definite degree of infection supports this view; again, the less satisfactory experience of the long period during which the organisms which have given rise to an attack of osteomyelitis or enteric fever may remain latent, is familiar enough. A certain number of organisms may no doubt be safely left to their fate and for the tissues to deal with.

The virtues of chemical antiseptics are restricted to the power to render sterile the wound surfaces and the cavity included by them. If this sterilisation be effected the patient is protected from the dangers of a renewed direct extension of the infection and from the risk of absorption of toxins formed by the bacteria which may collect under pressure in the recesses of the wound cavity. Further, the dangers and ill-effects of prolonged suppuration may be avoided.

To effect this purpose Lister's essentials of a thoroughly trustworthy unirritating antiseptic, so stored up that it cannot be dissipated to a dangerous degree before the dressing is changed, must be fulfilled.[4] It is of interest to recall that Lister in 1870 made a suggestion for the primary treatment of gunshot wounds consisting in the provision of an abundant supply of external dressing soaked in an oily solution of carbolic acid,[5] and again during the Boer War suggested the use of a powder of the double cyanide of mercury and zinc as an antiseptic reservoir,[6] but neither of these methods was largely employed or successful in application.

The Physiological Method.

The phylacagogic or physiological method of Wright seeks to attain the same objects as the antiseptic method by the

[3] On the Principles of Antiseptic Surgery, Virchow's Festschrift, 1891, ii., 344. The Collected Papers of Joseph Lister.

[4] The Collected Papers of Joseph Lister, vol. ii., p. 358, An Address on the Antiseptic Management of Wounds, 1893.

[5] Loc. cit., p. 161, A Method of Antiseptic Treatment Applicable to Wounded Soldiers in the Present War.

[6] Loc. cit., p. 331, Notes on the Double Cyanide of Mercury and Zinc as an Antiseptic Dressing.

local application of a physical process to regulate, modify, and alternately augment the strength of the various factors involved in the normal vital reaction.

It seeks: 1. To maintain the patency of the opened-up lymphatic vessels and spaces which normally undergo closure in the same manner as the wounded blood-vessels, and to encourage an increased flow of lymph from the wound surface with the following objects. (*a*) To effect a natural lavage of the tissues. (*b*) To maintain an outward current in the flow and thus oppose the entrance of microbes into the tissues. (*c*) To utilise the bactericidal properties of the fluid. (*d*) To remove exhausted lymph from the tissues in place of leaving it to return by the normal route of the lymphatic circulation. (*e*) To maintain a moist surface to the wound, and wash away débris of devitalised tissue and bacteria. In this last particular simple irrigation on the part of the hypertonic or isotonic solutions plays an important part.

2. At a latter date to encourage and increase the number of migrating leucocytes, both with the view of increasing phagocytosis and providing a sufficient supply of active trypsin to aid the separation of sloughs.

The normal outflow of lymph is increased by the physical ("drawing") process induced by continuous irrigation of the wound with a hypertonic solution of sodium chloride, and the augmented migration of leucocytes by similar alternate irrigation with "isotonic" solution (normal saline).

Before attempting to gauge the relative value to be assigned to the antiseptic or to the phylacagogic methods respectively it may be at once allowed that in some instances the unaided normal vital reaction may attain parallel results when treatment with simple dressings or mere exposure to air and sunlight is adopted, but unfortunately such results form rather the exception than the rule. Hunter in referring to the good results which may follow primary closure of the wound, or closure by scab formation, deals with them as an exception, and tells us "thus a power of resolution is shown, even in cases where the parts have been exposed."

It may be proper here to offer some preliminary criticism as to the validity of the theory upon which the phylacagogic method is based. Hunter says: "Yet injuries often excite more action than is required" (iii., 260). It is, indeed, indubitable that in a large proportion of all wounds the activity of the reaction exceeds that necessary for the process of repair, or for sterilisation of the tissues, proceeding in some even to the undesirable degree of acute inflammation and tissue destruction. In fact, in the process of repair, as in the normal physiological processes of the body generally, a large margin of excess is allowed to meet possible accidents in the course of the closure of the wound.

I think we may therefore assume that the normal vital reaction is not, as a rule, deficient in activity, and that even in a wound that heals normally by granulation, both the outflow of lymph and the migration of leucocytes tend to be wasteful of the vital powers of the patient. Again, it must not be forgotten that an excessive lymph flow in itself is a serious drain upon the powers of the patient, a fact illustrated in a remarkable degree by the rapid emaciation seen to occur in the subjects of the multiple superficial wounds which have formed so strong a feature of the surgery of the present campaign. Lastly, any interference with the coagulation which limits the primary flow of lymph following the wound, tends to remove one of the most important barriers afforded by nature for the protection of the system from the dangers of absorption of organisms and their toxins from the infected area.

Relative Value of Antiseptic and Physiological Methods.

The most useful practical test of the efficiency of any method of wound treatment is furnished by observation of the date at which micro-organisms disappear from the surface of the exposed tissues and at which the wound may be safely and permanently closed by suture or other means. When subjected to this test the antiseptic method has proved itself more rapid and more trustworthy than the phylacagogic.

As an example of the antiseptic method, that known as the Carrel-Dakin is chosen, because it appears to fulfil the conditions already laid down, and because in the hands of its originator it has afforded admirable results which have moreover been repeated by other surgeons and in our camps. It may be at once allowed that the method demands special care and exactitude in application, but such objections as may be raised as to its suitability for military surgery are of a practical and not of a theoretical nature. Such are the necessity of strict supervision of the standard composition of the solution of the hypochlorites employed, the need for care and judgment in locating the instillation tubes, the necessity of regularity in the instillations of the fluid, and the difficulty in some cases of ensuring that the patient's clothing and bedding do not get soaked. All these problems are more difficult of solution in military than in civil practice, but they are not insuperable, while the last trouble attends equally the irrigation forming a part of the phylacagogic method.

Allowing these practical difficulties, we find in compensation that the wound cleans more rapidly, firmer and healthier granulations form, the organisms die out more promptly, the occurrence of suppuration is reduced to a minimum, or actually avoided, secondary wound complications are rarer, and the wounds are fit for closure at a much earlier period. The treatment, moreover, attains success even when applied to suppurating wounds of some standing.

The special success which has attended the use of this method depends mainly on the highly ingenious plan of maintaining the constant supply of the antiseptic medium by specially devised tubes and on the character of the antiseptic employed. Other antiseptic methods, however, have attained results which, while less striking, yet are superior to those observed with the phylacagogic. Of these latter the most satisfactory have been the dressing with solution of hypochlorous acid (eusol) and the iodoform-bismuth method of Rutherford Morison.[7] The latter, which combines a maximum amount of rest to the wound, a "persistent storage" of an efficient inhibitory antiseptic, and a minimum of attention on the part of the surgeon, has much to recommend its employment in military surgery, where economy of time and labour is so important. Its employment as a primary method of treatment of gunshot wounds is, however, not free from serious risks, and therefore in the absence of further experience not advisable.

In application the phylacagogic method fails to realise the merits which have been claimed for it. The increased flow of serum from the tissues has proved of small value from the bactericidal aspect; the "fluid" "drawn" has been shown by other observers (Parry Morgan[8] and others) to be deficient in organic constituents, and hence incomparable to the normal lymph furnished in response to the stimulus of the original injury and resulting infection, and either in the "fluid" itself or admixtures of it with hypertonic salt solution organisms, such as the streptococci, grow freely. This deficiency in the quality of the "fluid" drawn is intelligible if it be regarded as the product of a local physical process exerted on the wound itself. Such a process can hardly be relied upon to induce great additional activity either in the fluid or cellular elements which are normally provided as a response to the combined stimulus of injury and subsequent infection on the organism as a whole, in which case we have to deal with a general vital reaction on the part of the entire system the whole intensity of which is directed upon the infected region. The phylacagogic method indeed, while attempting to increase the normal vital reaction within the tissues, an object not always to be desired, deals inefficiently with the extraneous elements in the wound cavity which form the main obstacle to normal healing.

In practice it is found with the phylacagogic method that the initial changes in the wound are slow, the tissues tend to become sodden, the separation of sloughs is delayed, and a longer period is required before the wound surface can be regarded as having reached the stage at which secondary closure can be effected. Hence the period in which secondary wound complications may arise is prolonged. Moreover, in cases treated by the hypertonic method which fail to reach the "closure" standard, a few days' treatment with an antiseptic often suffices to attain the result desired.

In passing from the subject of the local treatment of the wound we may conclude with Hunter that "the stimulus of imperfection taking place immediately calls forth the action of restoration"; further, that this vital operation may be most effectively aided not by striving to regulate and modify the process, but by attempting to nullify the influence of the factors which tend to distort and interrupt it.

[7] THE LANCET, 1916, ii., 268.
[8] Brit. Med. Jour., 1916, i., 685.

Gas Gangrene.

I can scarcely leave the subject of wound treatment in the present war without a word of mention of the most serious wound complication that has had to be dealt with, gaseous cellulitis or gas gangrene.

I can find no evidence that Hunter was familiar with this scourge. In the lectures on gunshot wounds a case is quoted in which "air came out of the wound" during the process of removal of a ball from the abdominal wall, but no mention is made of any special condition of the tissues, and it may well have been a *Bacterium coli* infection secondary to a minor injury of the colon. Hunter was certainly conversant with the rapid decomposition, with development of cellular emphysema, which sometimes follows death as a result of a general anaerobic infection of the body; hence we must conclude that he would have been quick to detect a similar form of cellulitis during life.

It seems more than doubtful whether gas gangrene has ever before assumed such a serious aspect during war. The writings of Ambroise Paré make no mention of emphysema as a sign in the gangrenous wounds observed by him, neither do the more modern writings of Guthrie suggest that the hospital gangrene seen in the wars of the early part of the last century in any way resembled the "gas gangrene" of to-day. It is clear that Lister, when speaking of hospital gangrene, referred to a process similar to that described by Guthrie, and surgical text-books generally have based their descriptions of hospital gangrene on a complex of identical signs. On the other hand, anaerobic gangrene, under the title of "acute traumatic gangrene," has been individualised as a definite disease and its pathology to some extent elucidated.

It is clear that the form of hospital gangrene observed during the American War of the Rebellion coincided in character with that described by Guthrie, and it is specially mentioned that the process did not involve the muscles; lastly, no mention of "gas gangrene" has been made in any of the more recent campaigns.

Hence I think it must be allowed that the frequency of gas gangrene is to be regarded as a peculiarity of this war, referable, perhaps, to the nature of the soil, and perhaps to the abundant diet of the men and irregularity in defæcation. In the latter relation it is a striking fact that of a small series of patients who died as a result of wounds of the colon in every case a general post-mortem anaerobic infection of the blood rapidly took place.

On the other hand, hospital gangrene of the classical types has been conspicuous only by its absence; during a period of two and a half years I have only seen one or two cases which seemed to resemble the spongy form, although the membranous type has been occasionally seen.

HUNTERIAN LIGATURE.

No individual procedure originated by John Hunter has preserved the freshness of his name to a greater degree than the operation for the cure of popliteal aneurysm. Every student of medicine at an early date of his career makes acquaintance with Hunter's canal, and later with the principle of proximal ligature.

In one respect the influence exerted on military surgery by the knowledge of the ease and safety with which proximal ligature can be performed has not been for the good. It has encouraged the employment of proximal ligature at the seat of election for secondary hæmorrhage and even for primary bleeding from a wounded artery. Both these practices are to be condemned except in rare instances of absolute necessity.

It is to be regretted that Hunter himself did not write the paper describing his operation and the grounds upon which he was led to undertake it, but the paper by Sir Everard Home included amongst Hunter's writings opens up one question of considerable interest to-day. In at least one of the cases there described (iii., 604, Case 3), possibly in the first three both the femoral artery and vein were included in the ligature, in the fourth we are definitely told that the artery only was included. From that period onwards surgical opinion has been definitely to the effect that the greatest care should be taken when occluding a main artery to avoid all injury to the vein. In fact, every operation for the ligature of an artery has been so devised that the aneurysm needle is passed in a direction away from the vein in order to minimise the risk of injury to that vessel. This not alone to avoid the technical inconvenience of immediate hæmorrhage, but also with the definite object of preserving the venous circulation intact.

Effect of Simultaneous Ligature of Artery and Vein.

Observation of a large number of coincident wounds of large arteries and veins has in no way endorsed the view that simultaneous occlusion of both artery and vein exercises any deleterious influence on the subsequent collateral arterial circulation and the vitality of the limb. In support of this statement a few examples illustrating the innocuous nature of operations for the occlusion of veins in general may be first given. Operations for the cure of varicose veins have demonstrated the ease with which a compensatory balance is attained when the blood is diverted from the larger channels. Occlusion of the internal jugular and other large venous trunks effected in order to prevent the diffusion of septic emboli (the process of septic thrombosis was, I believe, first observed and described by John Hunter himself (iii., 581)) has not given rise to obvious permanent trouble.

In a very considerable proportion of gunshot injuries to large arterial trunks the neighbouring vein is contused and becomes thrombosed, and this has not been shown to give rise to increased risk of gangrene of the limbs. Ligature of the common carotid artery together with the internal jugular vein *en masse* has been performed in cases of emergency without increased risk of the development of the cerebral anæmia and softening so often a consequence of ligature of the artery alone. Further, where simultaneous ligature of both artery and vein in other parts of the body has been obligatory on account of wounds of both vessels untoward events have not been observed.

Evidence, moreover, exists that under certain conditions simultaneous occlusion of both artery and vein is a preferable procedure. The first example, not an unmixed or simple one, may be sought in the results observed to follow the application of a single proximal ligature to the artery in cases of arterio-venous aneurysm or aneurysmal varices of the femoral vessels. In patients so treated during the South African campaign,[9] gangrene of the limb followed in more than 50 per cent. of the cases. The frequency of this accident finds a simple explanation if we consider what actually results from the operation. The main vessel being occluded and the direct arterial pressure from behind being abolished, blood which has been carried by the arterial collaterals to the distal portion of the injured trunk, instead of passing to the peripheral circulation, takes the course of least resistance backwards into the vein through the arterio-venous communication, and thus the limb practically bleeds to death much in the same way as if the distal end of the wounded artery opened on to the surface of the limb. Hence, the comparative safety of removal of the communication *en masse* and occlusion of all four openings by ligature.[10] [11]

A more striking example is offered by the result of ligaturing the popliteal vein alone for the treatment of senile gangrene of the foot. W. A. Oppel,[12] ascribing the good results occasionally observed to follow arterio-venous anastomosis for the cure of this condition to control of the venous circulation and consequent rise in the blood pressure of the limb, was led to substitute simple occlusion of the popliteal vein to produce the same effects. In six cases thus treated the extremities were seen to recover not only their warmth and colour without the development of œdema, but also a certain degree of hyperæmia of the feet and toes.

On these and other grounds it must be admitted that the balance of the collateral circulation is likely to be more efficiently maintained if the vessels which carry it on more nearly correspond in size and consequent equality in the blood pressure and rate of flow. The elimination, in fact, of the capacious main vein is a real advantage, since this for the time affords a too ready channel of exit for the diminished arterial supply as well as an undesirable reservoir for stagnation.

These considerations lead me not only to regard obligatory simultaneous occlusion of a main artery and vein as a negligible factor in the risk of gangrene of a limb, but to hold, further, that the procedure is preferable whether the vein be wounded or not; the result of the combined procedure being to maintain within the limb for a longer period

[9] Reports on the Surgical Cases noted in the South African War 1899-1902, Surgeon-General W. F. Stevenson.

[10] K. Saigo: Traumatische Aneurysmen im japanisch-russischen Kriege. Deutsch. Zeitsch. für Chir., 1906, lxxxv., 577.

[11] Leo Bornhaupt: Gefässverletzungen und traumatische Aneurysmen im russisch-japanischen Kriege. Arch. für klin. Chir., 1905, lxxvii., 590.

[12] Zentralbl. für Chir., 1913, ii., 1241-42.

the smaller amount of blood supplied by the collateral arterial circulation, and hence to improve the conditions necessary for the preservation of the vitality of the limb.

INFLUENCE OF HUNTER'S EXPERIENCE IN THE FIELD ON HIS LIFE WORK.

We may now turn from the question of how far the work of John Hunter has influenced that of the military surgeon of to-day to that of how his experience gained in the field may have influenced his own life's work.

Hunter was emphatically a student of nature; his early years were, as we know, spent mainly in the fields around his home, where he sought out such secrets as he could from his surroundings. This fallow period, while responsible for depriving him of a facile pen and literary style, yet no doubt opened his mind, developed habits of thought and observation, and affords some explanation of the superhuman task to which he set himself with such devotion in the later periods of his life.

The whole world was his book, and it is of some interest in passing to contrast the character of his upgrowth and surroundings with those of his greatest successor, Joseph Lister. Hunter gained his earliest inspiration from the limitless field of nature with naked eye and unbridled freedom. Lister, born into a home the cradle of the modern microscope, passed through a blameless career at school and college in a continuous atmosphere of scientific thought and investigation. Both great men devoted their whole energies to the cultivation of science throughout a busy and industrious life—Hunter throughout with a yearning for the pedestal, Lister concerned only with the success of his labours.

Hunter died in the midst of an incompleted and impossible task, while Lister had the incomparable satisfaction of witnessing the success of his own efforts, the goal reached, and the benefit to mankind immeasurable. Each illustrious man, however, perhaps found his proper field: Hunter in a life of continuous stress, immoderate labour, a struggle for his daily bread and the means to pursue his researches, and a tragic death not unsuited to the fiery nature of the man. Lister in a more equable existence, spent in steady and industrious pursuit of the one great object he had in view, and after attaining a success duly appreciated by the whole world passed quietly away in the zenith of his fame.

The abrupt change from a boyhood of untrammelled freedom to the life of a hard-worked demonstrator in a school of anatomy, than which no greater contrast can be conceived, laid heavy hands on Hunter, his health began to fail, and hence his transit to the field of war.

To join an army in the field is to enter the most intimate school of human nature. The most admirable features of man's character and the meanest are alike displayed. Unsuspected strength is revealed, long concealed weakness exposed, and in a year's campaign the events of a whole lifetime of ordinary existence may be passed through. Hunter entered this school at a turning-point in his career after two periods—the one of comparative idleness, the second of drudgery—and little doubt can exist as to both the sobering and inspiring effect it had upon his nature. As a result of his experiences he emerged a stronger and a better man, with a vastly wider outlook on the world, and doubtless capable of forming a juster estimate of his own powers and capacity to undertake the line of life for which he felt himself to be fitted.

The life of a military surgeon on active service, however, offers advantages beyond the mere acquisition of worldly wisdom and a knowledge of men. An army is not always fighting, and the surgeon, between periods of active and unceasing work, has intervals of quietude which are rare in any other path of professional life. Freedom from the cares of ordinary business and the manifold duties of practice allows uninterrupted opportunities for following out lines of thought and the prosecution of research. There can be no doubt Hunter utilised these opportunities to the utmost, for throughout his writings references are made to observations and investigations made during his period of service. He tells us, in fact, that his most comprehensive and complete contribution to scientific literature, the "Treatise on the Blood, Inflammation, and Gunshot Wounds," was the direct product of the experience gathered at that time. The long period which elapsed between the conception of the work and its publication is characteristic of Hunter's method—a method founded on the desire to complete his knowledge on any subject before submitting himself to public criticism. A method desirable in itself, but when adopted by a man whose aims are of the scope of Hunter's, too often, as in his own case, robs the world of receiving the benefits of a wealth of critical observation and knowledge which passes together with its owner to the grave.

Research in the Present War.

While considering the opportunities of research his military life afforded to Hunter, one cannot help comparing them with those enjoyed by the present generation. During this campaign laboratories both of the clinical type and those fitted for more extensive research have been provided not only for the base hospitals but also in connexion with the casualty clearing stations which have performed so much of the duties of stationary hospitals near the front.

A number of active young observers have been engaged in research on every problem which the wounds and diseases of the soldiers have raised, and it may be confidently expected that a weighty harvest of new facts will have been garnered when opportunity arises for their collation and digestion. The pathological anatomy of the lesions produced by gunshot injury to the brain, the spinal cord, the lungs, heart, and the abdominal viscera has been worked out to an extent that will leave little to desire. New facts regarding cerebral localisation have been noted, while others founded on animal experiments alone have been confirmed by injuries comparable to the knife of the physiologist.

Observations regarding the fevers of the field have been accumulated, and enormous practical experience of the value of the protective inoculation for enteric fevers has been acquired, while the prophylactic value of tetanus antitoxin and its influence in modifying the character of a subsequent attack has been placed beyond the region of doubt.

It is not perhaps too much to expect that not only the acquisition of this extended knowledge, but also the manner of its acquisition, will exert an enduring influence upon the workers to whom we are indebted for it, and a resulting benefit will be conferred upon the community as a slight return for the misery and suffering which have been imposed upon the present generation. May we not hope that many of the workers may be influenced as John Hunter was and remain to the end of their careers active searchers after, and exponents of, the secrets of nature as well as better practitioners of medicine.

CONCLUSION.

Many of my predecessors have striven with a varying measure of success to portray Hunter as a man and member of society, yet the strange paucity of material at command appears to render any estimate of his personality from this point of view incomplete and uncertain. I prefer to ask my audience to study his presentment as it hangs upon the wall before us, and from its inspiration to try to form a true conception of the man and the soul that was within him.

The concrete labour of his hands is still exhibited within these walls, while the germs contained in his writings have served to incite and direct the minds of the many searchers in the wide field of biology who have followed in his footsteps. If but one lesson could be learned—the secret of his untiring industry—and this pressed home on those whose privilege it is to follow in his path great indeed might be the benefit to mankind. The problems that to-day await solution are no less numerous or less vital than those John Hunter sought to unravel, while the constantly increasing means of investigation at command lay a growing responsibility upon the student.

The memory of John Hunter is fresh within these walls, and it is still green without, and I cannot perhaps better close this unworthy effort to sustain that memory than by quoting the words of one of his bitterest foes regarding the period of Hunter's life immediately following his return from the wars.

"During this time he found himself at leisure for meditating plans of life that plainly denote an intrepidity of mind and a vigour of application which natural obstacles unsurmountable by most could not suppress in him; (plans which few have attempted although supplied by the completest aid of early academic learning."[13]

Mr. President, posterity has judged how far Hunter succeeded in his aims, and has within the walls of this College awarded him a standing memorial which would, I think, have satisfied the man himself.

[13] Jesse Foot: Life of J. Hunter, p. 82.

An Address
ON
NAVAL MEDICINE IN THE GREAT WAR

Delivered at the Medical Society of London on Feb. 12th, 1917,

BY H. D. ROLLESTON, C.B., M.D. CANTAB., F.R.C.P. LOND.,

TEMPORARY SURGEON-GENERAL, R.N.; CONSULTANT PHYSICIAN, ROYAL NAVY; SENIOR PHYSICIAN, ST. GEORGE'S HOSPITAL.

MEDICAL PERSONNEL.

MR. PRESIDENT AND GENTLEMEN,—At the outbreak of war the permanent Medical Service of the Navy, with Sir Arthur May as Medical Director-General, was at once expanded by the mobilisation of its retired members, of officers on the emergency list, and of the medical officers of the Royal Naval Volunteer Reserve. In addition, a large number of temporary surgeons were entered, and about ten consultants were appointed, mainly to the large base hospitals. A considerable proportion of the temporary surgeons first passed through the large naval hospitals and received some instruction in naval routine and procedure. Rather later an old type of naval medical officer—viz., allied to that of surgeon's mate—was revived in the appointment of unqualified medical students who had passed their examination in anatomy and physiology, under the title of Surgeon-Probationers, R.N.V.R. They were usually appointed in batches of 15 to Haslar, where they were instructed in Service routine, accounts and returns, victualling of the sick and treatment of wounded in action, and were subsequently drafted to destroyers, which ordinarily do not carry medical officers, and to other small sea-going ships, to render first-aid. After a certain period of service many of them were granted leave to prepare for and pass their final examinations, and so to become temporary surgeons.

The work of the clinical laboratories of the large base hospitals was assisted by the utilisation of men with laboratory knowledge but without medical qualifications, who, however, did not receive naval rank. Dr. P. Fildes was sent to Haslar by the Medical Research Committee and was of the greatest use in dealing with the bacteriological examination of the numerous convalescents from dysentery, enteric ever, and other intestinal diseases sent from Gallipoli.

Queen Alexandra's Royal Naval Nursing Service was more than trebled by the mobilisation of the reserve nursing sisters. The number of nursing sisters at the large base hospitals was thus very largely increased and they were supplied to the hospital ships, which usually carry four nursing sisters, two regulars and two reserves. The existing sick-berth staff, which was considerably depleted when the Fleet was mobilised, was supplemented by the Naval Auxiliary Sick Berth Reserve, composed mainly of men from the St. John Ambulance Brigade.

TRANSPORT OF THE WOUNDED AND SICK.

Transport-duties are familiar to naval officers, and their services have naturally been utilised during the war. The naval transport, both at home and abroad, has been under the control of Surgeon-General Sir James Porter, K.C.B., who, early in 1915, went out to supervise the transport arrangements in Gallipoli for the Army as well as the Navy. Fresh developments in methods of transport, such as a new ambulance sling (Boydon), a monowheel stretcher-carrier (Rev. B. Close), the use of the movable-cot system on ambulance trains, and improvements on hospital ships have been evolved.

Ambulance trains.—Of the four naval ambulance trains in use at present in this country, the larger ones, made up of 12 coaches and carrying 120 cot cases, travel from the north to the south as occasion requires, in ordinary times about twice in ten days. Once a week they take the patients off the hospital ships, and rather less often they collect patients from the naval hospitals in the vicinity of the naval bases. The patients are dropped in succession at the large naval hospitals, Plymouth, Haslar, Chatham, and occasionally at Portland. These, colloquially called "round" trains, carry two medical officers, a crew of 36 stewards and sick-berth attendants, but no female nurses. Two padded rooms are provided for the reception of lunatics. A small ambulance train of six coaches, called "the shuttle," travels locally between the naval bases and the local hospitals. Sir James Porter and Acting Staff-Surgeon A. V. Elder, R.N.V.R., devised a plan whereby the Service cot, into which the patient is placed in his own ship or in the hospital ship, is securely suspended and lashed up against the fender at the side of the coach in the ambulance train, thus avoiding the fatigue necessitated by transfer from a stretcher to a fixed cot in the ambulance train.

Hospital ships.—The experience of the present war has somewhat modified previous conceptions of the uses of hospital ships. In peace-time a hospital ship accompanies the Fleet and serves as a mobile base hospital until it becomes full, when she leaves the Fleet in order to discharge the patients to a land hospital, and for the time acts as a marine medical transport, or, in other words, a marine ambulance (Elder[1]). In the South African War (1899–1902), in the transport of wounded and sick across the Channel, and in the case of their service between the Mediterranean and this country at the present time, our hospital ships did, and now, act as "Marine Ambulances"; and in the Russo-Japanese War (1904–5) the two Japanese naval hospital ships worked on these lines. In modern naval engagements, contrary to what might have been anticipated,[2] the hospital ships cannot accompany the Fleet and take charge of the wounded for the following reasons: (1) the hospital ships could not keep up with the rapidly moving battleships; (2) the transfer of wounded from a battleship to the hospital ship would be possible only in exceptionally calm conditions; and (3) the transfer of wounded would oblige the battleship to heave to, and thus expose it to hostile submarine attack. In order to meet this want it has been suggested that fast vessels of about 500 tons, registered under the Geneva Convention, and fitted with appliances for rapidly picking up survivors from the sea, should be employed on the scene of a recent action. But this plan has not been put into effect.

The use of hospital ships in war-time may, as Elder points out, be divided into: 1. The intervals between actions, during which the hospital ship remains at the naval base until it is full—for four or more weeks—and then discharges its patients, by steaming to a railhead, to an ambulance train. During its stay at the naval base the load of the hospital ship may be lightened from time to time, and its stay thus prolonged, by evacuation of some patients to a hospital carrier which conveys them to a land hospital or ambulance train. A large number of surgical operations are performed in a hospital ship during its stationary period at a naval base and minor cases when cured return to duty in the Fleet.

2. The post-action phase, when the hospital ships are collected at the naval bases to await the arrival of the battleships, receive the wounded, and serve as clearing stations. The wounded and burnt are sorted and as rapidly as possible evacuated to the shore and to the ambulance trains. Severe cases, which would obviously suffer from transport, are taken to the comparatively small hospitals in the immediate neighbourhood, but all suitable cases are at once despatched by the ambulance trains to the large base hospitals in the south of England, so as to clear the land hospitals in the vicinity of the naval bases for the reception of further instalments of wounded.

Immediately after a battle, therefore, a hospital ship ceases to act as a base hospital and becomes a clearing station, and should be evacuated as rapidly as possible, as their capacity for cot cases—on an average 250—does not admit of any extension. It should be added that a hospital ship may be employed as a permanent floating hospital for infectious diseases at a naval base which is remote from such hospitals on land.

Hospital ships, like ambulance trains, had to be brought into being when war broke out, and were provided by the transformation of liners. They were staffed by the existing executive crews of the company and by naval medical officers, with a Fleet-Surgeon in charge, and with nursing sisters.

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[1] Elder, A. V.: On Hospital Ships and Their Functions, Jour. Roy. Nav. Med. Service, 1916, ii., 443.

[2] At the Battle of the Yellow Sea on August 10th, 1904, the Russian hospital ships followed their Fleet, and, as the Japanese point out, ran the risk of being accidentally torpedoed. (The Surgical and Medical History of the Naval War between Japan and Russia (1904–1905), 1911, pp. 121, 150.)

THE HEALTH OF THE NAVY.

In considering this subject a distinction may conveniently be made between the health of (i.) the shore depôts and training establishments; (ii.) the Service afloat; and (iii.) the Royal Naval Division and the Marines serving on land.

I.—*The Shore Depôts and Training Establishments.*

The barracks, depôts, and training establishments are more exposed than the Service afloat to invasion by epidemic and other infections on account of their contact with the civilian population, the influx of new entries, and, especially in the case of the boy-training establishments, by the massing together of large numbers of youths who are more susceptible than adults to many of the common epidemic affections. Further, the health of the Fleet has been protected by the adoption of quarantine measures as regards drafts sent to it from the shore depôts. The liability of the shore establishments to epidemic disease is shown by the incidence of cerebro-spinal fever; out of 274 cases in the Navy during the first two years of the war, 252, or 92 per cent., occurred on shore; thus, there were 63 in the Portsmouth area, 58 in the Plymouth area (including 22 cases from boy-training ships), 42 at the Crystal Palace depôt, 39 in the Chatham area, 27 at the Deal depôt, and 18 at Shotley.[3] Shetlanders in barracks suffered much from measles, probably on account of the absence of any racial immunity to this disease.

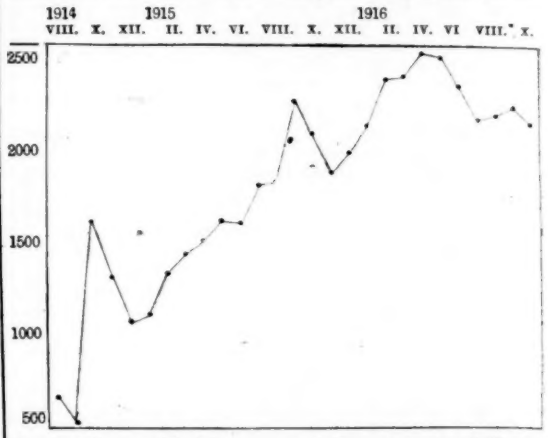
II.—*The Service Afloat.*

The health of the Fleet—our first line of defence—is of such paramount importance that it demands more detailed description. Under this heading reference will be made first to the Grand Fleet in home waters and then to the Mediterranean Fleet.

The Grand Fleet.—The general health of the Grand Fleet has been extremely good, indeed probably better than in times of peace. The average daily percentage of sick in the whole Fleet in 1913 was 2·37, and in 1914 a little lower, 2·03. Since the outset of war cases of sickness have naturally been sent off to hospital more rapidly than in peace time, and thus the daily sickness in the Fleet is diminished. But even allowing for this, the average daily sickness in the Grand Fleet has been extremely low, almost always under 1 per cent., and indeed has fallen since the outbreak of war. This percentage incidence would have been even less had it not been for the higher rate of sickness among the reservists and pensioners. Most of the sickness was of a minor character, such as seasonal influenza and boils.

Infectious diseases.—Measles, mumps, rubella, scarlet fever, and diphtheria occurred, but in the majority of instances they subsided after the appearance of the initial cases. An interesting point was the severity of measles among the Shetlanders both on the Fleet and among the reservists stationed at Lerwick, where there was a severe epidemic early in 1915 (McVittie). In ordinary times measles is rarely seen in the Shetlands, but when it is introduced an epidemic results. This severity of the disease in a race unprotected against it recalls the devastating epidemics of measles in the adjacent Faröe Islands in 1781 and 1846, in Fiji in 1875 and 1907, and in the neighbouring island of Rotumá in 1911 (Corney [4]). Dr. R. P. Heddle, medical officer of health of Kirkwall, writes that in some of the Orkneys measles is often absent for 15 or 20 years, and that when it occurs the children have it in much the same manner as in the south, but that adults take it severely and often suffer from pneumonia and occasionally from meningitis. I saw a relapse of measles in a Shetlander on the twenty-eighth day of the disease at Chatham—an extremely rare event. No case of small-pox occurred in the Fleet, thus showing the value of vaccination which has been compulsory in the Navy since about 1858. Except in the Mediterranean Fleet there were very few cases of enteric fever. Small outbreaks in three ships were traced respectively to infected oysters dredged up from Langstone Harbour, near Portsmouth, to a carrier, and probably to contaminated water taken on board at Montreal.

With the prolongation of the war it would naturally be expected that the amount of sickness would increase, and study of a curve showing the monthly average of officers and men in the large naval hospitals, Chatham, Haslar, Plymouth, for the figures of which I am indebted to Surgeon-General D. T. Hoskyn, Surgeon-General G. Welch, and Surgeon-General W. H. Norman, shows that, allowing for two peaks due to extraneous causes (campaigns on land), there was a gradual rise from the beginning of the war until April, 1916, after which there came a slight fall. This would at first sight appear to confirm the anticipation of increased sickness. But, as already mentioned, the daily average percentage of sick in the Fleet had fallen during this period,



Graph of the monthly daily average of officers and men of all naval branches in the large naval hospitals at Chatham, Haslar, and Plymouth. The steep rise in October, 1914, was due to the admission of a large number of Belgian officers and men. The rise in September and October, 1915, was coincident with a large influx of patients from the Royal Naval Division on Gallipoli.

and it is therefore probable that the absolute increase of sickness, as shown by returns of the hospitals, is mainly due to the steady increase in the strength of the Navy during the progress of the war. Although there are, of course, no official figures obtainable as to the present strength of the Navy, it may well have so increased as to account for the doubling of the absolute number of sick, while the relative percentage incidence in the Grand Fleet has even fallen.

The Mediterranean Fleet.—In the Eastern Mediterranean squadron during August, October, and November, 1915, almost every ship was attacked by epidemic gastro-enteritis, which, however, died down in December. There was a fair number of cases of typhoid, paratyphoid, and dysentery between August and the end of December, 1915. The dysentery was mainly amœbic, and in many cases was associated with jaundice. The infection of these diseases was probably conveyed by flies and by men returning from the beach. The health of the Adriatic squadron at this time was excellent, and the average daily sickness for the whole Mediterranean Fleet from August 15th, 1915, to Oct. 31st, 1915, was 2·24 per cent., and from Nov. 1st, 1915, to Jan. 31st, 1916, 1·52. This compares favourably with a daily percentage of 2·37 sick for the whole Fleet in 1913. From Feb. 1st to April 30th, 1916, the health of the Fleet was even better with a daily percentage of 1. Between May 1st and July 31st, 1916, the daily average of sick was 1·14 per cent. A mild form of pyrexia (sand-fly fever) was prevalent at Salonika in May and appeared in some of the ships in the Eastern Mediterranean, and at intervals cases of paratyphoid, dysentery, and malaria occurred. In the quarter ending Oct. 31st, 1916, the daily percentage of sick was 1·08; dysentery and malaria were less frequent than in the previous three months, and typhoid and paratyphoid rare. No cases of beri-beri have been reported from the Mediterranean Fleet. For this information I am indebted to Sir A. May and his assistant, Fleet-Surgeon W. L. Martin, R.N.

During August and September, 1915, there was an extensive epidemic of dengue at Bermuda, and the average incidence of the disease in men of war there was 3 per cent. only. Meagher's [5] observations there support the view that the disease is spread by mosquitoes.

The good bill of health of the Fleet as a whole—a tribute to preventive medicine—is due to the following factors:

[3] THE LANCET, 1915, ii., 909; 1917, i., 54.
[4] Corney: Proc. Roy. Soc. Med., 1913, vi. (Sect. Epidem.), 138.
[5] Meagher: Journ. Roy. Nav. Med. Service, 1916, ii., 188.

1. The comparative isolation of the fleets, and especially of the Grand Fleet, thus necessitating absence of venereal disease and of opportunities for alcoholic excess incident to the temptations of seaports. In the Fleet the men's daily allowance of stimulant is half a gill of rum, and special precautions are taken to prevent the adsorption of unused allowances by other men. 2. The quarantine precautions in drafting from the shore establishments to the Fleet, instituted by the Medical Director-General, Sir Arthur May. 3. The lectures given by the medical officers to the ships' crews on personal hygiene, dealing especially with the dangers of venereal disease and alcoholic excess. These lectures appealed to the common sense of the men, and as an illustration of their good effect it may be mentioned that on the return from leave of the men (about 1100) of one great battleship there were only three cases of gonorrhœa and one of syphilis. 4. Measures to obviate the effects of monotony entailed by awaiting events which have been long anticipated. Thus, when possible, regattas, boxing competitions, and other entertainments are got up, and both by their preparation and performance brighten up the men. In the Grand Fleet the short days of winter are the most trying, and then, in addition to entertainments, lectures, for example, by those who have made visits to the front in France, and cinema shows serve a useful purpose. Each big ship has its cinema, and there is a scheme of circulating films between the various ships. Periodical leave is also provided. 5. Improvement in the ventilation of the ships, due to the adoption in 1914 of the recommendations of a committee, of which Fleet-Surgeon R. C. Munday was the secretary, appointed in October, 1912, to consider the best methods of ventilating modern warships.

Influence of mobilisation and war on the health of the navy.—After this summary of the satisfactory state of the health of the Fleet a few words may be said as to the bad influence which mobilisation and war might be expected to exert on the health of the Navy. Large numbers, running into tens of thousands of men of the Royal Naval Volunteer Reserve, the Royal Naval Reserve, and the Fleet Reserve were called up and had necessarily to be rapidly passed into the ships during the first few days of the war, and as a result a certain proportion of unfit slipped through. The incidence of sickness was therefore naturally much higher in the Royal Naval Volunteer Reserve and Royal Naval Reserve than in the Royal Navy, which may be regarded as a picked body of healthy men. Cases of failure of cardiac compensation, of relapses in pulmonary tuberculosis, and of diseases which had previously led to discharge from the service were not infrequent, and dental caries and insufficiency extremely common. As cases of organic valvular disease of the heart are invalided out of the service, malignant endocarditis, which usually supervenes on existing valvular disease, is a rare disease in peace time—averaging about two cases a year. Since the outbreak of war I have seen ten fatal cases (six examined post mortem) and one of that exceptional but allied condition malignant aortitis, chiefly but not entirely in reservists and pensioners.

In addition to the cases in the Navy a case occurred at Haslar of acute malignant endocarditis in a Belgian soldier who was for months under treatment for severe burns; after being normal for a long time the temperature suddenly shot up and the patient died in 12 days with, as the necropsy proved, acute malignant endocarditis. The interest of the case is that the onset and duration of the disease could be accurately determined.

The numerous new entries, mostly quite young, who are exposed to the depressing conditions incident to their change of life, such as vaccination, the fatigue of unaccustomed drills, and homesickness, provide a favourable soil for the occurrence of infectious diseases, such as measles, rubella, scarlet fever, mumps, and cerebro-spinal fever. Outbreaks of infectious diseases occurred, but it is remarkable that there was not more illness.

The effect of long-continued strain on men, especially pensioners and reservists, in activating latent disease, such as tuberculosis or heart disease, was naturally seen. In the Navy these two conditions lead to invaliding, and their recrudescence was therefore more frequent among reservists and pensioners called up for the duration of the war. Pulmonary tuberculosis in ships was not so frequent as some anticipated from the conditions necessitated by the war

Strain, physical and mental, precipitated tabes dorsalis and general paralysis of the insane in some syphilitic subjects; and a generous view from the pension aspect has been adopted by the Admiralty. Some cases of incipient tabes have been utilised by work of a less arduous physical character. During the siege of Paris in 1870 it was noted that exophthalmic goitre became more frequent, and this has appeared to me to be true, both during the Boer War and the present campaign. Much discussion has taken place as to the influence of hyperthyroidism in the etiology of the so-called soldier's heart. Over-excitation of the ductless glands may result from excitement or from toxæmia due to acute infections; and Hurst [6] points out that as over-activity of the thyroid can be more early recognised than that of the other ductless glands the resulting condition has been regarded as simple hyperthyroidism, but that the change is more complex, being really a disturbance in the activity of all the ductless glands. Diabetes mellitus, the incidence of which might conceivably be favoured by nervous strain, does not appear to me to have become unduly frequent.

The prolonged and monotonous strain necessitated by life in the Fleet favours mental deterioration, psychasthenia, and neurasthenia, especially in those with a neurotic taint and in those who have not been through a long training. Further, the short interludes of acute stress and excitement which punctuate the periods of monotonous alertness may so disturb the already vibrating balance as to precipitate an acute breakdown with violent though transient symptoms and delusions. The burden of responsibility and in a small ship the influence of comparative isolation on the senior officer favour mental instability, and may lead to a want of self-confidence bred of brain-fag. In an interesting psychological study of the influence of periods of (1) monotonous watchfulness, (2) acute stress, and (3) comparative calm on a ship's company during the first six months of the war, Beaton [7] found that mental troubles of a really serious nature occurred in less than 1 per cent. and mild neurasthenic conditions in less than 4 per cent. With the prolongation of the war the results of the continued and monotonous strain would naturally be expected to become more noticeable, but, as far as my impression goes, not to anything like the extent that would have been expected. This happy result is no doubt due to several factors—the fine spirit of confident superiority in the men, and the hygienic measures already mentioned. The effect of good moral in preventing mental disturbance was seen by the freedom of the men from these manifestations after the Jutland Battle.

Casualties during action.—With this subject I can attempt to deal in very brief and imperfect outline only. As compared with land warfare, the large number of men killed outright in naval actions is striking. In the Russo-Japanese naval war of 1904–05 there were 3692 killed and wounded, of whom 1883 were killed outright (including 1388 probably drowned [8]). It is not considered advisable in the public interest to give the figures for the Battle of Jutland, but from the total loss of battleships the numbers of men presumed to be drowned, though, of course, many in the sunk ships may have been killed, wounded, or burnt, must obviously have been very large.

Wounds.—As compared with wounds in the trenches, where the clothing and skin are ingrained with filth, wounds in naval actions obviously differ, and have been classed with those of severe machinery accidents. Wounds of soft parts and compound fractures were due to shells, their splinters, shrapnel, and fragments of the ships' structures. Several cases of eye injuries necessitated enucleation, and in one remarkable instance an eye was found to contain a piece of bone ¾ inch square, apparently from the vault of another man's skull (L. Fraser [9]). The treatment of wounds by new antiseptic applications has been advocated by Sir Watson Cheyne (borsal), who also investigated Dakin's antiseptic, and a green spray of perchloride of mercury and malachite green (Fildes, Rajchman, and Cheatle [10]) has been used with success at Haslar. The rival claims of the antiseptic method and of the physiological hypertonic salt solution treatment have led to an

[6] Hurst, A. F.: Medical Diseases of the War, p. 127, 1917.
[7] Beaton, T.: Jour. Roy. Nav. Med. Serv., 1915, i., 447.
[8] The Medical and Surgical History of the Naval War between Japan and Russia (1904–1905), 1911, p. 588.
[9] Fraser, L.: Journ. Roy. Nav. Med. Serv., 1916, ii., 440.
[10] THE LANCET, 1915, ii., 165.

encounter between the President of the Royal College of Surgeons and Sir Almroth Wright.

Burns form an important proportion—at least a third—of the casualties in action, and fall into two main categories: 1. General and severe burns due to the ignition of our own cordite or to burning furniture. As the result of prolonged exposure to these flames destruction of the tissues is deep, the immediate mortality high, and sepsis and deformity especially prone to occur. 2. Burns of the exposed skin of the face and hands due to the momentary flash of high-explosive shells in a confined space. The flash is of such short duration that from instinctive closure the eyes escape, and the thinnest covering, provided it is not inflammable, almost completely protects the skin (Muir [11]). In the *Lion* about half the wounded had burns of the face and hands alone (Maclean and Stephens [12]). There seems to have been a general agreement that the Service picric-acid dressing was most efficacious as a first application, but subsequently moist and mild antiseptics were found to be more suitable. The new treatment by ambrine is now officially provided. [13]

Shock, even in cases of slight injury, was found to be excessive, and for this reason immediate operations should be avoided (Muir). As a means of obviating shock morphine proved a sheet-anchor, $\frac{1}{4}$ to $\frac{3}{4}$ grain being injected hypodermically. The sublingual method of allowing tablets to dissolve under the tongue, which is convenient as it does not necessitate the presence of a medical officer—the tablets being served out by an executive officer—was not satisfactory. The administration of $\frac{1}{2}$ pint of warm bovril containing 2 oz of brandy proved beneficial in the *Tiger* in the Jutland Battle.

Poisoning by gases from explosives.—The detonation of shells such as lyddite and the burning of our own cordite liberate large quantities of CO and CO_2, but the most powerful factor in the production of "gassing" is nitric oxide. The symptoms usually come on after a comparatively uneventful interval; and possibly during this incubation period the NO and NO_2 are oxidised into nitric acid (Symons [14]), which accounts for the acute irritant effects on the respiratory tract. Severe headache and vomiting are early symptoms, followed by cough, husky voice, dyspnœa and cyanosis which become progressively worse, rapid respirations reaching 80 or more per minute, restlessness, pain and tightness behind the sternum, orthopnœa, frothy, sometimes blood-stained expectoration, and œdema of the lungs. Prophylactic treatment is most important and quite effective; it consists in the immediate application of the Service respirator containing cotton-waste soaked in the usual soda solution. The respirator should be worn round the neck from the beginning of the action, so as to lose no time in putting it in position. The treatment of the declared condition is unsatisfactory. Though theoretically attractive, atropine does not appear to have been successful. Some benefit has been ascribed to brandy, the production of vomiting, and the repeated administration of spiritus ammoniæ aromaticus in 1 oz. of water.

Cases of carbon monoxide poisoning occurred, and I had the opportunity of seeing three cases among men employed in putting out a fire in the bunkers of a collier. One of these presented curious nervous symptoms, resembling in some respects peripheral neuritis but more probably functional in nature, which persisted for two years.

Delayed pneumonia after immersion was noticed by Deputy Surgeon-General H. W. G. Doyne in some cases after the sinking of the *Cressy*, *Pathfinder*, and *Hermes*. Pneumonia occurred about three weeks after the immersion.

Appendicitis is not rare in the Navy in peace-time; before the war it occurred in about 0·2 per cent. of the personnel of the Navy. Since the war began it is impossible to give the percentage, but it is by no means uncommon. I am indebted to Surgeon C. J. G. Taylor, R.N.V.R., for figures which show a decided percentage increase in the incidence of appendicitis directly after the Battle of Jutland among the sick from the engaged ships. He also points out that there was a similar rise in the incidence of appendicitis directly after a sweep of the Fleet in the North Sea when contact with the German Fleet was almost established. On the other hand, when the Hospital Ship *Soudan*, in which he served, was present at the opening stages of the Gallipoli operations, and the men were exposed to conditions of naval warfare, the incidence of appendicitis among 11,619 cases of wounds, sickness, and accident was low—viz., 0·2 per cent.

III.—*The Royal Naval Division.*

The Royal Naval Division served in Belgium, Gallipoli, and is now in France under the Army. The Marines also fought on land in Mesopotamia. The naval forces have therefore been exposed to the same infections and diseases as the armies with whom they have been associated. The contrast between the incidence of disease in the Service afloat and the Naval Divisions on land is as striking as that between the conditions of naval and military warfare generally. Even if statistics were available, it would be impossible to deal fully with the diseases among the Naval Division in Gallipoli, as this would be equivalent to a consideration of military medicine, but a few points of interest may be mentioned.

As has always been the experience in war until quite recently, diseases due to infection through the alimentary canal—diarrhœa, typhoid, paratyphoid, dysentery, and jaundice—levied a heavy toll in Gallipoli, and a large number of men were invalided to this country.

Diarrhœa was so frequent that it was regarded as an incident rather than a cause of going sick, and a solid motion was the exception rather than the rule on the Peninsula; men might go to the latrines ten times daily for months without reporting themselves as sick. As it was common when sand-storms were prevalent, it was called sand diarrhœa, but it is probable that it was not entirely due to the purely mechanical irritation of the sand, but that the sand conveyed micro-organisms into the food, and that flies, which were a veritable plague at Gallipoli, may have played a carrier part in the infection of food.

Dysentery, the amœbic and bacillary forms being predominant at different periods, claimed many victims, but the treatment by emetine and antidysenteric serum gave very satisfactory results. Indeed, many cases of amœbic dysentery appeared to have been cured by the time they arrived in this country, and thus amœbic dysentery appeared, as judged by the observations in this country, to be less common than it was reported to be in the Eastern Mediterranean. Among 143 cases in 1916 in which Mr. H. A. Baylis found protozoa in the fæces, 29, or 20 per cent., showed *Entamœba histolytica*. Emetine was freely given, and in some instances the question arose whether subsequent palpitation, breathlessness, arrhythmia, and precordial pain were due to the poisonous effects of the acute infection, excessive smoking, or the remedy emetine; for experimentally emetine has been found to produce ventricular fibrillation (Levy and Rowntree). It is interesting to note other bad effects of this successful drug—peripheral neuritis and chronic diarrhœa with or without blood which must be distinguished from a recurrence of dysentery. On the other hand, the freedom with which emetine was given may have been responsible for the rarity of hepatic abscess. Three cases of entamœbæ in the urine with temporary vesical irritation, possibly due to rupture of a small pericolic amœbic abscess into the bladder, came under my notice. Urinary amœbiasis has apparently seldom been observed, as Scott Macfie [15] refers to 15 cases only.

Bacillary dysentery as judged by a series of late convalescent cases examined serologically by Dr. P. Fildes was found to be more often—in the proportion of 8 to 1—due to Flexner's bacillus than to Shiga's. This seems to be contrary to the general experience in Gallipoli, but the conditions of the acute infection in which the bacilli can be isolated from the fæces and of late convalescence when the agglutination reactions were performed are not really comparable. The diagnosis with which patients arrived in this country was often changed as the result of laboratory examination, and sometimes mixed infections were discovered. Among 481 cases which gave positive agglutinations pointing to bacillary infections of the alimentary canal examined at Haslar, some of which were multiple, Dr. Fildes found that 30 per cent. were due to *B. typhosus*, 23 per cent. to *B. paratyphosus A*, 20 per cent. to *B. paratyphosus B*, 22 per cent. to *B. dysenteriæ* Flexner, and 0·3 to *B. dysenteriæ* Shiga.

[11] Muir: Journ. Roy. Nav. Med. Service, 1916, ii., 415.
[12] Maclean and Stephens: Ibid., 1916, ii., 425.
[13] THE LANCET, 1917, i., 201.
[14] Symons: Journ. Roy. Nav. Med. Service, 1916, ii., 516.
[15] Scott Macfie: Ann. Trop. Med. and Parasit., Liverpool, 1916, x., 291.

A large number of patients were invalided home with intestinal symptoms clinically described as paratyphoid or dysentery which, however, could not be serologically or bacteriologically proved to be due to any known infection, and were therefore labelled by the non-committal term of "enteritis." The antityphoid inoculation was fully justified by results.[16] Much bacteriological work was necessitated in the testing of patients sent home for intestinal diseases in order to prevent the escape of carriers into the general population. The increase in the number of patients in the large naval hospitals due to this cause is shown by the peak on the chart during September and October, 1915.

Epidemic jaundice, apparently imported from Egypt, was very common in Gallipoli at the end of 1915. The degree of the jaundice did not run parallel with the malaise, for men considerably bronzed continued at work while others with but slight icterus were obliged to go sick. Its etiology gave rise to much discussion; from the freedom of many patients from preceding gastro-enteritis (McBean Ross,[17] Hurst[18]) it seemed unlikely that it was catarrhal jaundice in an epidemic form. Similarly there was no evidence that it was due to dysentery or enteric fever. In some instances it followed these diseases, but usually after an interval as an accidental event. I have seen it develop in England in convalescent dysenteric and typhoid patients. The suggestion that it was due to paratyphoid (*B. paratyphosus dardanellensis*) infection of the biliary system has not been substantiated. Hurst regards the disease as an acute infection of the duodenum by an organism allied to *B. paratyphosus A*, which should therefore be treated with the same precautions as enteric fever. The only necropsy that I have seen showed severe gastro-enteritis with a plug of tenacious mucus in the orifice of the biliary papilla. Dilatation of the heart was a definite feature, and peripheral neuritis (beri-beri) was noted as a not infrequent sequel. In one case under my care glycosuria followed the jaundice.

A form of peripheral neuritis identical with beri-beri in its clinical aspects occurred in Gallipoli and in Mesopotamia; 12 cases of beri-beri were treated at the Royal Naval Hospital, Plymouth, in 1915–16, and at least 15 such cases at Haslar during the same period. In this outbreak the usual etiological explanation of beri-beri—namely, the absence of the specific vitamine—presented difficulties; but Willcox,[19] who recognised that jaundice often preceded this beri-beri, supported the deficiency hypothesis of the disease by the explanation that the diet suitable for jaundice, diarrhœa, dysentery, and paratyphoid fever contains extremely little, and that tinned food is almost entirely devoid of the anti-beri-beri vitamine which is destroyed by a temperature of 130° C. An ingenious hypothesis was put forward by A. F. Hurst, who revived Hamilton Wright's view that beri-beri is the result of a specific infection of the duodenum, the toxins produced by which exert a special action on the nervous system. As the epidemic jaundice in Gallipoli was regarded as the result of such a duodenitis, which, however, did not always obstruct the common bile-duct, the occurrence of this beri-beri-like neuritis after jaundice, or even without previous icterus, can be thus explained, and the necessity of relying entirely on a deficiency in vitamines in the food is no longer binding. The dilatation of the heart and dropsy, which were marked features of some cases of beri-beri seen in Haslar, can thus be correlated with the dilated heart described in the epidemic jaundice.

Other fevers occurred in Gallipoli and Salonika, such as malaria, which was recently prevalent among the Royal Naval Air Service at Thasos and Cassandra in the autumn of 1916, both the forms of trench fever, and sand-fly fever. The value of anti-choleraic inoculation and of the efforts of the Health Department at the Dardanelles was shown by the freedom of the Royal Naval Division from cholera and plague, which Deputy Surgeon-General O. W. Andrews tells me were prevalent among the Turks in the immediate neighbourhood.

War nephritis and trench or Gallipoli sore, apparently analogous to the veldt sore in the South African War, and due to a Gram-positive diplococcus (Archibald, Hadfield, Logan, and Campbell[20]), were also reported.

A considerable number of bullet wounds of the chest with resulting *hæmothorax* were under observation at Haslar during the early part of the war, and as a rule were watched and not explored unless there was definite evidence of an embarrassingly large infusion or of infection, and, though recovery was slow, the vast majority did well. This was in accordance with Makins's advice based on experience in the Boer War. In the present war the practice in the Army has been to tap sterile hæmothorax except when small, and this course has not led to infection and has hastened recovery. In the trenches infection of a chest wound is much more prone to occur than was the case on the relatively sterile veldt.

DISEASES OF AIRMEN.

The chapter of aeroplane injuries and diseases—which from its interest may be briefly mentioned here—has been begun by Staff-Surgeon H. V. Wells.[21] From leakage of petrol spray the pilot may become dizzy, and the exhaust gases from the engine—carbon monoxide and dioxide—may cause headache, drowsiness, and malaise. The rarefied atmosphere at great elevations may induce the symptoms well known in balloonists, and Wells refers to a case of frost-bite in an airman who had been exposed to 34° of frost at an elevation of 15,000 feet. Psychasthenic symptoms—namely, loss of self-confidence and the resulting mental worry (aerosthenia)—are not uncommon, and prove that the victim has mistaken his sphere of activity. Flying is undoubtedly the job of a young man under 30 years of age, and not every young man is temperamentally or physically fitted to carry it through. Perfect eyesight is necessary to ensure safe landing, correction with glasses being not without its dangers; perfect hearing is essential to detect the first indications of engine defect, and free movement of the joints of the lower limbs to control the stearing-gear. Fits and tendency to faint absolutely deter the aspirant from the air service. In one remarkable instance at Haslar an airman who fainted, with the result that the aeroplane dived nose downwards 1200 feet into a ploughed field, escaped with such minor injuries that he was at first extremely loth to give up this branch of the service.

[16] Vide Bassett Smith: Journ. Roy. Nav. Med. Service, 1917, iii., 30.
[17] McBean Ross: Ibid., 1916, ii., 317.
[18] Hurst, A. F.: Medical Diseases of the War, p. 104, 1917.
[19] Willcox: Journ. Roy. Army Med. Corps, 1916, xxvii., 191; and THE LANCET, 1916, i., 555.
[20] Archibald, Hadfield, Logan, and Campbell: Journ. Roy. Army Med. Corps, 1916, xxvi., 695.
[21] Wells, H. V.: Journ. Roy. Nav. Med. Service, London, 1916, ii., 65–71

ON THE

PASSIVE IMMUNITY CONFERRED BY A PROPHYLACTIC DOSE OF ANTI-TETANIC SERUM.

BY A. T. MACCONKEY, M.B., B.C. CANTAB., D.P.H.;
AND
ANNIE HOMER.

THE occurrence of cases of tetanus even though a prophylactic injection of serum has been given draws attention to the comparatively short duration of the complete passive immunity conferred by a dose of antitoxin. There are many references to this in the literature from 1893 (Roux and Vaillard) down to the present time (Vaillard, 1916), and yet this fact does not seem to be as fully recognised as it ought to be even now.

It has been stated that after a subcutaneous injection of antitoxin the antitoxin content of the blood reaches its maximum in 2–3 days and then remains fairly constant till about the seventh day, when it begins to decrease. It is also said that a sufficient dose of antitoxin gives complete protection for several days and partial protection for 2–3 weeks. The object of the following communication is to record some experiments which bear on this point. These experiments form part of a larger series which was undertaken with the object of ascertaining the most economical, and at the same time reliable, method of using tetanus antitoxin.

Our first object was to find out the smallest quantity of antitoxin which would give complete protection for one week. For this purpose several series of guinea-pigs were taken and each animal in a series received a subcutaneous injection of the same amount of antitoxin, but the number

of units given to each series was different. Seven days later the immunised animals and a series of controls received an injection of tetanus toxin subcutaneously. The experiment was repeated until the results were quite clear, as may be seen in Table I.

Note.—To avoid repetition it may be stated that all injections were given subcutaneously in the abdominal region.

TABLE I.

Dose of toxin (U.S.A.).	Anti-toxin units.			Controls.	Anti-toxin units.			Controls.	Anti-toxin units.			Controls.	Anti-toxin units.			Controls.
	½	7	10½		½	7	10½		1	2	3		¼	½	¾	
0·000002 g	N	N	N	Sl	...	...	...	...	...	...	...	...	...	...	...	...
0·000003 g	,,	,,	,,	M	N	N	N	Tet.*	N	N	N	+5	N	N	Sl	...
0·000004 g	,,	,,	,,	,,	,,	,,	,,	+4	,,	,,	,,	+5	Sl	Sl	Mo	...
0·000005 g	,,	,,	,,	Ml	,,	,,	,,	+4	,,	,,	,,	+3	+12	,,	N	+6
0·0 0006 g	,,	,,	,,	,,	,,	,,	,,	+4	,,	,,	,,	+3	Ml	N	Tr	...
0·000007 g	,,	...	...	...	,,	,,	,,	+3	,,	,,	,,	+3	,,	Sl	,,	+4-5

* Tetanus, but recovered. N = Nil (no symptoms of tetanus). Sl = Slight attack of tetanus. Ml = Mild attack. Mo = Moderate attack. Tr = trace. + = Death, and the number which follows indicates the day on which death occurred. Two numbers (4-5) refer to the night between two days.

We see that ¼, ½, or ¾ U.S.A. unit does not afford complete protection for one week, though these amounts saved life against a dose of toxin which was fatal to the controls. If, however, we give 1 unit or more we obtain complete immunity during at least one week. As an ordinary man is about 220 times heavier than these guinea-pigs, this would mean that, calculating by body-weight only, a man would require some 250 U.S.A. units to protect him for a week, while a dose of 500 U.S.A. units would allow for man being twice as susceptible as the guinea-pig.

It might be urged that the conditions of the experiment were not similar to those occurring in actual practice. In order to meet this objection an experiment was carried out in which each animal received a small dose of toxin some time before the serum and then further small doses of toxin at short intervals, until by the seventh day each animal had received a lethal dose of toxin (0·000006 g.). The results are shown in Table II.

TABLE II.

No. of animal.	Days—						Result.
	1	2	3	4	6	7	
1-5	0·000001g toxin	3 units of antitoxin	...	0·000001g toxin	...	0·000004g toxin	N
6-10	0·000001g toxin	10 A.M. 6 units	3 P.M. 0·000001g toxin	0·000001g toxin	0·000001g toxin	0·000002g toxin	...	N
11-15	0·000001g toxin	9 units	0·000001g toxin	0·000001g toxin	0·000001g toxin	0·000002g toxin	...	N

N = Nil (no symptoms of tetanus).

It is obvious that giving part of the toxin (1/6 of a lethal dose) before the serum has made no difference to the result.

If we increase the interval between antitoxin and toxin from 1 week to 10 days we find that the immunity is beginning to diminish, and if we wait 2 weeks before testing the immunity we obtain results which confirm those of previous observers and which show that most of the protection afforded by an injection of antitoxin has disappeared. There may, however, be a partial immunity sufficient to save life, though not to prevent an attack of tetanus. (Table III.)

TABLE III.—*Immunity after 10 Days.*

Dose of toxin.	Dose of antitoxin in units.				Controls.
	1	3	6	9	
0·000004 g	Trace for 4 days.	Nil.	Nil.	Nil.	Mild tet., recd.
0·000005 g	Nil.	S.L.T. for 3 days.	,,	,,	+5-6
0·000006 g	,,	Nil.	+ 7-8	,,	...
0·000007 g	S.L.T. for 1 week.	Mild tetanus.	S.L.T. for about 1 week.	S.L.T. for about 1 week.	+4-5

S.L.T. = slight local tetanus.

TABLE IV.—*Immunity after 2 Weeks.*

Dose of toxin.	Antitoxin units.			Controls.	Antitoxin units.			Controls.
	3½	7	10½		3	6	9	
0·000003 g	Trace.	Slight.	Mild.	Slight.	...	...	...	K 13*
0·000004 g	+7	+8	+6	+6-7	Trace	+8-9	Mod.	...
0·000005 g	+7	Trace.	Slight.	+6-7	,,	+7	,,	+6
0·000006 g	Trace	,,	+6	+6-7	K 5*	+6	Slight.	...
0·000007 g	Mild.	,,	+7	+6	Mod.	Trace	,,	+4-5

* K 5 and K 13 = killed on fifth and thirteenth day respectively because of severity of the attack.

When the immunity has diminished so much in the course of a fortnight after an injection of tetanus antitoxin one is not surprised to find that practically all is gone at the end of three weeks.

TABLE V.—*Immunity after 3 Weeks.*

Dose of toxin.	Number of units of antitoxin.				Controls.
	1	3	6	9	
0·000004 g	+ 5-6	+ 7-8	Mod. tet.recd.	+ 8-9	Mod. tet.recd.
0·000005 g	+ 4-5	+ 4	+ 4-5	Mod. tet.recd.	+ 8-9
0·000006 g	+11-12	+ 4-5	+ 5	+ 5-6	...
0·000007 g	+ 4	+ 3-4	+ 4-5	+ 5-6	+ 4-5

From these results it would seem that the increased dose of antitoxin has not had an appreciable effect in increasing the duration of the subsequent immunity.

In view of these results it seemed advisable to try whether a very much larger dose than had so far been given would give a correspondingly better result. Each of 5 guinea-pigs received beneath the skin of the abdomen 40 U.S.A. units of tetanus antitoxin, and after an interval of 2 weeks the test doses of toxin. (Table VI.)

TABLE VI.—*Immunity 2 Weeks after 40 U.S.A. Units of Antitoxin.*

Antitoxin.	Toxin.	Result.
40 U.S.A. units.	0·000003 g	No symptoms of tetanus.
,,	0·000004 g	Mild tetanus from 5th to about 15th day
,,	0·000005 g	Trace of local tetanus 8th-15th day.
,,	0·000006 g	,, ,, ,,
,,	0·000007 g	Mild tetanus from 7th to about 20th day

We see, then, that even such a large dose as 40 U.S.A. units (corresponding to at least 8000 units in man) does not afford complete protection for a fortnight. It would also seem that Levin (1909) was right when he expressed the opinion that we cannot hope by increasing the dose of antitoxin to increase greatly the duration of passive immunity.

These results led us to go a step further and to give an enormous dose, a dose which would allow us to compare our results with those of Ruediger (1913), who stated that 250 U.S.A. units of tetanus antitoxin would protect guinea-pigs for from four to six weeks against a dose fatal to the controls. Unfortunately, he does not mention whether the protection was complete or not. We gave to each of a series of guinea-pigs 250 U.S.A. units of antitoxin and tested their immunity at the end of four weeks. (Table VII.)

TABLE VII.—*Immunity 4 Weeks After 250 Units of Antitoxin.*

Antitoxin.	Toxin.	Result.
250 U.S.A. units.	0·000006 g	Mild tetanus—well within 3 weeks.
,,	,,	Moderate ,, — ,, ,, ,,
,,	,,	,, ,, — ,, ,, ,,
,,	,,	Slight symptoms.
,,	,,	Mild attack—well within 3 weeks.

This large dose has protected, but not completely, though there was never any question of life being endangered. Now there happened to be available 13 guinea-pigs which had each received 10 c.c. of antitetanic serum in the ordinary course of routine testing. To each of these animals was given beneath the skin of the abdomen the official minimal lethal dose of the standard dry powdered test toxin which has been used in all the (previous) tests detailed in the paper. (Table VIII.)

A consideration of the results of these experiments fixes our attention on two points which stand out prominently.

The one is the extreme differences in the susceptibility of guinea-pigs to tetanus toxin; the other is the enormous doses which apparently we must give when we aim at obtaining passive immunity of long duration. Of course, it would, in present circumstances, be quite impracticable to use for man doses corresponding to some of those we have given to guinea-pigs, and we must content ourselves with the smaller doses, even though the protection does not last as long as we would wish.

TABLE VIII.

No.	Anti-toxin.	Interval between injection of antitoxin and of toxin	Toxin.	Result.
	U.S.A. units.	Days.		
1	9000	27	0·000006 g	No symptoms of tetanus.
2	3000	27	,,	,, ,,
3	3000	27	,,	Trace of tetanus present from 3rd–6th day and then passed off.
4	2200	31	,,	Very slight symptoms; recovery.
5	2200	31	,,	,, ,,
6	3000	40	,,	Very slight tetanus. Death 21st day.
7	3000	40	,,	Tetanus. Death 6th day.
8	3500	47	,,	,, ,,
9	3500	47	,,	Slight tetanus; recovery.
10	3500	40	,,	,, ,,
11	3500	40	,,	Mild tetanus; recovery.
12	3000	28	,,	Only a trace; recovery.
13	3000	28	,,	No symptoms.

We have now to decide upon what is the best thing to do, knowing that we cannot count upon producing an immunity of long duration by the use of a single prophylactic dose of tetanus antitoxin. There are two ways of dealing with this question. On the one hand, we might, after giving the prophylactic dose, simply keep very careful watch for the first signs of incipient tetanus and then at once treat the case energetically. We have not noticed in the literature any suggestion that this course should be followed, though it is possible that as our knowledge of the disease and its early symptoms increases, it may turn out to be after all the best practice. On the other hand, we may repeat the protective dose with the object of keeping up the immunity. There is in favour of this latter view a large volume of opinion, much of it recent and based on experience gained since the war began.

Park and Williams (1914, p. 331) say that where tetanus infection is suspected the antitoxic serum should be given a second, or even third, time at intervals of seven days. V. Behring (1914) considers that if the infection of the wound continues the prophylactic dose should be repeated and antitoxin might also be injected locally.

Teutschländer (1915) goes so far as to recommend that as long as there may be tetanus bacilli in the body, then if thorough surgical treatment with removal of all foreign bodies—including their capsules when encapsulated—cannot be carried out, a *curative* dose of serum should be given whenever the temperature rises or there is any suspicious change in the condition.

Bazy (1916) is in favour of repeating the injections every eight days for a month. Among others who express opinions similar to the above may be mentioned Dubs (1915), Witzel (1915), Fraenkel (1915), Aschoff (1915), H. E. Robertson (1916), Kümmell (1916), Bérard and Lumière (1916), Montais (1916), and Capitan (1916).

Finally, we may quote from a communication made by M. Vaillard to the Academy of Medicine, Paris, on Sept. 5th, 1916, in which he says:—

"..... le Sous-Secrétaire d'Etat au Service de Santé a bien voulu me confier, de concert avec notre collègue M. Roux, l'examen des observations recueillies, pour en déduire les enseignements qu'elles comportent sur la prevention du tétanos. Les considérations présentées à la suite de cet examen lui ont inspiré une instruction en date 10 Juin, 1916; j'ai cru devoir les communiquer à l'Académie."

He mentions that the passive immunity conferred by a dose of antitoxin lasts only about 8–12 days, and that if toxin is still being produced in the body after this lapse of time there will be no antitoxin present to neutralise it, and then:—

"Si au contraire la provision d'antitoxine est renouvelée en temps opportun, la preservation sera prorogée pour un nouveau laps de temps après chaque nouvelle injection. De là, pour certaines blessures particulièrement dangereuses, l'absolue nécessité de ne pas confier l'immunisation à une seule injection préventive, et de réitérer ces injections tant que persiste la menace du foyer infecté d'où peut sortir le tétanos."

He then goes on to speak of late tetanus, and concludes:—

"De ces considérations on est conduit à déduire que les *réinjections* méthodiques de serum antitoxique fourniront un des moyens de mieux assurer la prevention du tétanos consecutif aux blessures récentes et d'étendre le même bénéfice aux periodes plus ou moins éloignées de l'evolution des plaies. Il serait regrettable que la crainte de l'anaphylaxie dont la survenance a été exagérée surtout à la suite des injections sous-cutanées détournât les chirurgiens d'une pratique judicieuse qui a fait ses preuves."

This question of anaphylaxis was brought prominently forward by M. de Massary before the Société Médicale des Hôpitaux de Paris in October, 1915, when he referred to the case of a soldier who was wounded and received an injection of serum. Wounded again a month later, he told the surgeon of the previous injection. Owing apparently to fear of anaphylaxis a second dose of antitoxin was not given. Five days later tetanus supervened and ended fatally.

The discussion which followed this communication ended in the appointment of a committee to inquire into the question of the effect of reinjections of serum. The committee was composed of MM. Achard, Aviragnat, Barbier, Chantemesse, Marfan, Netter, Siredey, and Louis Martin, who, after very careful consideration of the subject, drew up a report which was published in the *Bull. Société Méd. des Hôpitaux de Paris*, Nov. 19th, 1915, p. 1076, and which may be summarised as follows:—

They define a "reinjection" of serum as any injection which is made not earlier than 15 days after the previous injection.

Intravenous reinjections, they consider, should not be used as a routine measure, but be limited to cases of plague and grave tetanus, and above everything the injection should be made very slowly so that it can be stopped if necessary before much has been given.

Of *intraspinal reinjections* they say that it is impossible to give indications or contra-indications, for it is a surprising fact that in the same patient these injections are sometimes well borne and sometimes give rise to anxiety. The serum should be run in very, very slowly, and the needle left *in situ* for a time so that, should any disquieting symptoms occur, as much fluid as is necessary may be allowed to flow out again. When all fear of trouble is over the needle may be removed.

Subcutaneous reinjections are rarely followed by grave symptoms, and the risk of their occurrence cannot be compared with the risks run by the patient if a reinjection is not made. When there is urgent need for it the reinjection of serum should never be omitted owing to the fear of anaphylactic trouble.

Reinjections should not be given after a meal during the period of digestion, and should be given where the cellular tissue is very lax. They should be given slowly and stopped at the first sign of trouble. One should be doubly careful in the case of tuberculous subjects, asthmatics, those subject to urticaria, hay fever, or who are affected by various scents (e.g., smell of horses), or where there is any suspicion of purpura. In such conditions one should proceed very slowly with the first portions of the injection, one should stop at the slightest sign of anaphylaxis, and then, if all is well, begin again an hour or so later.

The final conclusion of the committee is that:—"On ne peut, dans aucun cas, reprocher à un médecin d'avoir pratiqué une réinjection de serum dans un but prophylactique ou thérapeutique."

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A CLINICAL AGGLUTINOMETER:

AN APPARATUS FOR USE AT THE BEDSIDE OR IN THE LABORATORY FOR MAKING RAPID ESTIMATIONS OF THE AGGLUTININ TITRE OF THE BLOOD.

BY R. P. GARROW, M.D. ABERD., D.P.H.,
CAPTAIN, R.A.M.C.

(*Report to the Medical Research Committee.*)

IN the *Archives of Internal Medicine*, Dec. 15th, 1910, C. C. Bass and J. A. Watkins describe "A Quick Macroscopic Typhoid Agglutination Test." In carrying out this quick test a drop of 1 in 5 dilution of blood is placed on an ordinary plain microscopic slide along with a drop of a specially dense (about 10,000 millions per c.c.) emulsion of *B. typhosus*. The two drops are mixed together on the surface of the slide, and made to move to and fro by gently rocking the latter for two minutes. A positive result is indicated if the emulsion is broken up into small white masses or clumps visible with the naked eye.

The technique about to be described is simply an elaboration of Bass and Watkins's method with the object of rendering it not merely a qualitative test for agglutinins in the blood, but an accurate quantitative estimation of the agglutinin titre of the blood. This object is attained by means of an apparatus which I have devised and called a "clinical agglutinometer."

The clinical agglutinometer consists of the following parts:—

1. *A diluting slab.*—A painter's palette made of glazed white porcelain having three rows of seven small cups, and a trough in which the saline solution is contained. (See Fig. 1.)

2. *Diluting pipette.*—An ordinary dropping pipette with teat.

3. "*Standard*" *platinum loop in handle.*—The loop is 3 mm. diam. and bent at a right angle with the stem of the wire.

4. *The agglutinometer slide.*—A piece of ordinary clear glass 25 cm. long, 30 mm. broad, with smooth edges. It is divided by two lines crosswise into three equal parts. (See Figs. 4, 5, and 6.)

5. *Set of emulsion bottles in stand.*—The bacterial emulsions I have used in the agglutinometer are: *Bacillus typhosus* Eberth, *B. paratyphosus A* Brion-Kayser, *B. paratyphosus B* Schottmüller, *B. dysenteriæ* Shiga, *B. dysenteriæ* Flexner, *B. dysenteriæ* His, *B. enteritidis* Gaertner, *B. fæcalis alkaligines*, *B. coli communis*, *Vibrio choleræ* Koch, *Micrococcus melitensis* Bruce, *M. paramelitensis*. The emulsions are made from 24-hour surface agar cultures. The growth is scraped off the surface of the medium in platinum loopfuls and emulsified in 0·1 per cent. formalin in normal saline. The emulsions used for this method should be dense ones—about 10,000 millions per c.c.

FIG. 2.

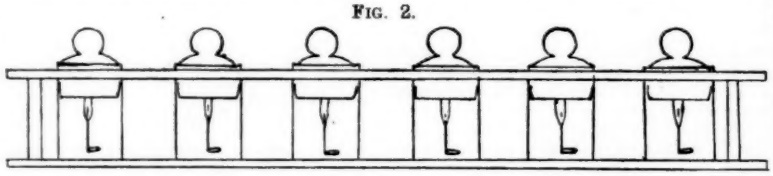
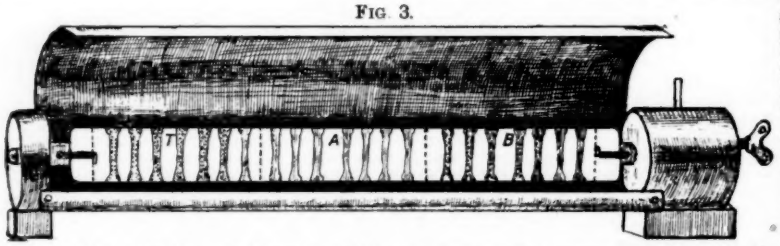


FIG. 3.

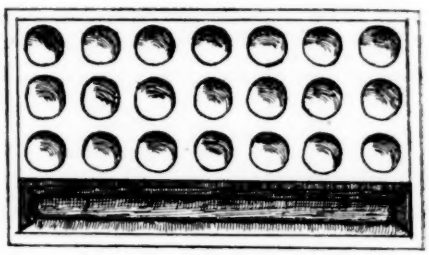


The density of all the emulsions should be uniform as far as the eye can judge. Each bacterial emulsion is contained in a small clear glass bottle with wide mouth, having a stopper bearing a "standard" platinum loop bent at a right angle with the stem of the wire. These platinum loops are in all respects the same as the platinum loop in handle. The most generally useful emulsions for diagnostic purposes are *Bacillus typhosus*, *B. paratyphosus A*, *B. paratyphosus B*, and *Micrococcus melitensis*. (See Fig. 2.)

6. *The mechanical mixer.*—This consists of a mechanical contrivance, by means of which the agglutinometer slide is made to revolve on its long axis slowly (about ten revolutions per minute) in an atmosphere saturated with aqueous vapour. The moist chamber is a cylinder of celluloid placed horizontally, the upper half being jointed to form a lid, the lower half lined with filter paper soaked with water. The revolving movement is obtained by means of a simple clockwork attached at one end of the cylinder. It can be stopped at will by means of a lever (after the manner of a Dudgeon's sphygmograph). (See Fig. 3.)

7. *A pocket centrifuge.*—A small apparatus, not larger than a matchbox and weighing less than two ounces, for centrifuging the blood in Wright's capsules.

FIG. 1.



8. Pocket lens. Spirit lamp. Bottle of normal saline. Swabs of cotton-wool. Wright's capsules. Agglutinating sera.

Description of Technique in the Use of the Clinical Agglutinometer.

1. *The diluting process.*—(*a*) The blood for examination is taken from the lobe of the ear in the usual manner into a Wright's capsule, and centrifuged.

(*b*) By means of a dropping pipette (which during the whole process should be held vertically to ensure equality in size of the drops) place four drops of saline into cup No. 1 of the diluting slab and two drops into each of the other cups in the row.

(*c*) To cup No. 1 add one drop of the serum to be tested and mix thoroughly by drawing into and expressing from the pipette three times. This forms a 1 in 5 dilution of the patient's serum.

(*d*) Transfer two drops from the cup No. 1 to cup No. 2, and again mix thoroughly. This forms a 1 in 10 dilution.

(*e*) Again transfer two drops from cup No. 2 to cup No. 3, and mix thoroughly. This yields a 1 in 20 dilution, and so on to cup No. 7 (1 in 320 dilution).

2. *The mixing process.*—The process of mixing the blood serum and bacterial emulsions is carried out on the surface of the agglutinometer slide. The 25 cm. slide, divided by two lines into three segments, is long enough to take a triplicate series of the seven dilutions, so that the titre for T., A, and B emulsions can be found simultaneously. Beginning with the highest dilution (1 in 320) loopfuls of the various dilutions of blood serum are deposited in triplicate on the slide which is lying flat on the bench. Opposite each loopful of serum is placed a loopful of bacterial emulsion, as shown in Fig. 4.

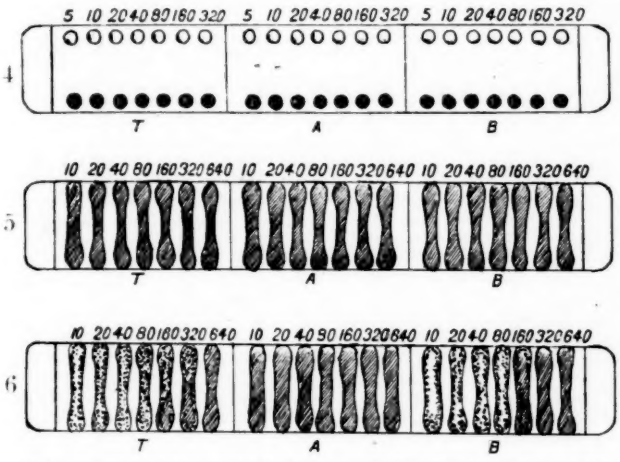
Equality in size of loopfuls can only be obtained by holding the handle of the platinum loop vertically throughout the entire process. Beginning with the highest dilution and passing towards the lowest, the loopfuls of serum and emulsion are mixed across the slide with the edge of the platinum loop. When this is complete there are on the surface, mixtures of bacterial emulsions of T., and A and B with blood serum in the following titres: 1/10, 1/20, 1/40, 1/80, 1/160, 1/320, 1/640. (Fig. 5.)

The slide so loaded is placed carefully in the moist chamber of the mechanical mixer where it is received and held fast by a clip at each end. The clockwork is started by means of the lever, and the slide allowed to revolve slowly for five minutes, during which time the mixtures run to and fro across the slide. The bulk of fluid is not enough to allow

the mixtures to run off the slide at the edges, nor for the various dilutions to run into one another.

At the end of five minutes the agglutinometer slide is removed and examined by the naked eye (aided, if necessary, by a pocket lens) *in a good light against a black background.* Agglutination converts the mixtures from homogeneous milky emulsions into a condition in which the agglutinated masses of bacilli float about like minute white flakes in a clear fluid. In a strongly agglutinating blood this takes place in the lower dilutions almost instantaneously after the agglutinometer slide begins to revolve. The change is very striking and can be easily seen with the naked eye. In the higher dilutions the change may take three or four minutes and be observable only with the aid of a pocket lens. If no change is visible with the pocket lens in the 1 in 10 dilution at the end of five minutes' time limit no agglutination of any diagnostic significance is present in the blood.

The diagram, Fig. 6, represents the appearance of the agglutinometer slide in the case of a patient whose blood agglutinates T. up to 1 in 320 and B up to 1 in 160, the A emulsion being negative.



(*Note.*—It is absolutely essential that the examination of the slide be carried out in a good light against a black background some distance away (say 3 or 4 feet), otherwise it is difficult or impossible to read the results.)

In examining the bloods of patients suffering from typhoid and paratyphoid infection it will frequently happen that all the dilutions up to 1 in 640 show agglutination. In such a case a further series of higher dilutions in the same geometrical progression is made, thus:—

(*a*) Into each of the cups in the second row on the diluting slab drop two drops of normal saline.

(*b*) Transfer two drops from the 1 in 320 dilution to cup No. 1 of the second row and mix thoroughly—this makes 1 in 640 dilution.

(*c*) Transfer two drops of 1 in 640 dilution into cup No. 2 of the second row and mix thoroughly, and so on to as high a dilution as it is considered necessary to reach the agglutinin titre of the blood. Now clean the agglutinometer slide with a cotton-wool swab wet with 5 per cent. carbolic, dry it, and flame it. Distribute the higher series of dilutions in platinum loopfuls on the slide in precisely the same way as for the lower series of dilutions, place opposite each dilution a loopful of emulsion, mix the two together across the slide, and place the slide in the mechanical mixer as before. The agglutinin titre of the blood is *the highest dilution in which definite flakes of agglutinated bacilli can be seen with the aid of a pocket lens.* It is, of course, essential that the dilution beyond this (the ultimate dilution) be *absolutely negative.* This indicates the penultimate dilution as the limit of the agglutinin titre of the blood and acts as a control for each test.

Theory of Action of the Agglutinometer.

For the purpose of explaining the action of the agglutinometer the phenomenon of agglutination may be considered to consist of two processes:—

1. The union of agglutinin with the agglutinable substance (whether this is in the nature of a true chemical union or is merely "adsorption" is here immaterial).

2. The aggregation of the bacilli into clumps. Both these processes are greatly accelerated by the movement to and fro to which the mixtures of serum and emulsions are subjected in the mechanical mixer. Different portions of agglutinin and agglutinable substances are constantly being brought into contact with one another and their union facilitated. The same constant movement of a staining solution over a section of tissue or a blood film hastens the staining process and renders it more complete. For the same reason photographers use a mechanical rocker which causes the developing solution to move constantly to and fro over the photographic plate. The physical change—the aggregation of the bacilli into clumps—is also greatly accelerated *by rolling the bacilli on one another.* In the lower dilutions in which agglutinin is concentrated, agglutination appears instantaneously throughout the emulsions, but in the higher dilutions, in which agglutinin has been reduced to a mere trace, the clumps will be seen to form slowly along two lines which correspond to the junction of the quickly moving central stream and slowly moving peripheral stream on either side—that is to say, the position in which the rolling action on the bacilli is most marked. They tend to pass outwards into the peripheral stream and finally settle along the edge of the fluid.

The Uses and Advantages of the Clinical Agglutinometer.

Simplicity.—The technique is simple and easy. Little is left to the manipulative dexterity of the operator, and thus satisfactory results should be obtained by men with little experience of the method.

Speed.—The method is extremely rapid. After a little practice, specimens of blood can be examined and the results recorded at the rate of 10 per hour—an all-important consideration in war-time.

Accuracy.—The titre found by the agglutinometer in 5 minutes is the same on an average to within one dilution, as that obtained by the elaborate method in tubes in 2–24 hours. The end-point is as sharp as that in tubes and easily read after a little practice. The method is therefore capable of detecting with all sufficient accuracy those fluctuations in titre which take place during the course of enterica. The special sphere of usefulness of the clinical agglutinometer is in the making repeated examinations in those cases of clinical enterica after triple inoculation in which attempts at isolation of the bacillus from the blood, urine, and fæces have failed. Evidence is accumulating that in these cases this special method of examination gives valuable help in diagnosis at a small cost in time, trouble, and material.

The diagrams illustrating this article were kindly drawn for me by Captain Philip H. Bahr, R.A.M.C. This agglutinometer may be obtained through Dr. Thos. G. Nicholson, resident medical officer at the London Fever Hospital, Liverpool-road, Islington, London, N.

A SHORT NOTE ON

THE EFFECT OF PYREXIA ON INOCULATION AGGLUTININS.

BY G. SELBY WILSON, M.B., B.S. LOND., M.R.C.S., L.R.C.P. LOND.,
TEMPORARY LIEUTENANT, R.A.M.C.

(*From the Bacteriological Laboratory, Charing Cross Hospital.*)

IN consideration of the large number of results which have been published by Dreyer, Inman, and Ainley Walker, working by the macroscopic method on the one hand, and Tidy, working by the microscopic method on the other hand, in regard to the effect of pyrexia on the agglutinin content of the blood of those persons who have been previously inoculated with typhoid vaccine, and in view of the discordancy which has occurred in the conclusions which have been drawn from these two methods, it was suggested that it would be interesting to examine the serum of each individual patient by both the macroscopic and microscopic procedures. For this purpose a series of 97 soldiers and others, who had been inoculated within the preceding 20 months against typhoid fever, was taken, and the agglutinin titre of the

serum of each case was estimated in the manner already stated.

The technique of the experiments was as follows:—

The macroscopic method was similar to that employed by Dreyer, with the exception that the killed typhoid emulsion was not standardised, so that the results as here given cannot be recorded in terms of his agglutination units. Tubes were put up in the following dilutions of serum: 1 in 25, 50, 125, 250, 500, 750, 1000, 2500, 5000, and 7500. The end point was taken as occurring in that dilution in which agglutination was just visible with the aid of a small magnifying glass. Thus, e.g., if agglutination could just be seen in a dilution of 1 in 500, this was taken as the end point, but if agglutination was quite distinct in a dilution of 1 in 500, and was absent in a dilution of 1 in 750, the end point was taken as the mean of these two—namely, 1 in 625.

For the microscopic method an emulsion of bacilli was prepared from a 24 hours' subculture on agar, the same strain of bacillus being used throughout the whole course of experiments, both macroscopic and microscopic. Dilutions of serum were put up as 1 in 25, 50, 125, 250, and 500. The end point was taken as that dilution in which marked agglutination was present after half an hour's exposure at room temperature; this did not exclude the presence of a few motile bacilli. In case of doubt as to the exactness of the reading, an intermediate dilution was put up. Dilution was continued till no agglutination was seen, and this was found to be not greatly in excess of that in which marked agglutination was present.

The cases have been divided into three classes:—

Class I. contains those patients who subsequent to inoculation had run no temperature at all.

Class II. contains those patients who since their inoculation had run a temperature of 102° F. or more for at least four days, generally not longer than a week.

Class III. contains those patients who since their inoculation had run a temperature of between 100° and 102° for periods of over a week, in many cases lasting for several weeks.

A glance at the tabulated figures will show:—

1. That the average agglutinin titre of sera obtained from patients who have suffered from a febrile attack since inoculation is lower than that of those who have had no such attack.

2. That as regards the effect of pyrexia on the agglutinin titre there appears to be no appreciable difference between a short high and a long low temperature.

3. That in this respect the results as obtained by the macroscopic and microscopic methods, taken on the average, are very similar; thus the average dilutions in which agglutination occurred in Class II. and III. are practically half of those in which agglutination occurred in Class I., as estimated by both methods.

4. That the relations in the individual cases between the two methods are extremely variable, the macroscopic method showing very marked agglutination in some cases in which the microscopic failed to demonstrate any at all. It will be noticed that the difference between the average results in the various classes cannot be due to a variability in time from the date of inoculation, for they all approximate to the same period of months.

5. That it is an obvious advantage when making repeated quantitative estimations to use a method which gives agglutination over a great range of dilution, since small differences are so much more easily recognised. Especially is this the case in dealing with the question of the diagnosis of typhoid in inoculated patients, when frequent examinations at short intervals are required.

Before drawing any conclusions from these figures it would be well to notice Tidy's statement in THE LANCET of Jan. 29th, 1916, to the effect that a temperature of 102° F. lasting for four days is apparently sufficient to lower the agglutinin content of the blood to such an extent that a negative reaction will be obtained; if, on the other hand, complete agglutination in a 1 in 50 dilution of serum by the microscopic method is present on the fifth day, the patient is probably suffering from an attack of typhoid fever. Now, were this the case, no fewer than 25·9 per cent. of the patients in Class II., which consists of those who had run a temperature of 102° F. or over for four days or more must have been suffering from typhoid fever, whereas clinically they presented no symptoms or signs of such a condition, the great majority of the temperatures in the whole series of cases being due to septic wounds.

The results obtained were:—

Class I.: 48 Cases.

Case No.	Months since inoculation.	Macroscopic: serum dilution 1 in—	Microscopic: serum dilution 1 in—
1	20	180	20
2	19	3500	200
3	19	3750	100
4	18	1750	20
5	16	1750	50
6	16	85	0
7	16	1750	100
8	14	375	50
9	14	750	20
10	14	750	0
11	13	750	20
12	13	3750	150
13	12	350	0
14	12	750	20
15	12	375	20
16	12	25	0
17	12	1750	20
18	12	1750	50
19	12	1750	50
20	12	750	0
21	12	180	20
22	11	1750	150
23	11	85	0
24	11	1750	50
25	11	375	0
26	10	3500	350
27	10	7500	100
28	10	1750	20
29	10	750	20
30	9	3750	100
31	9	375	20
32	9	750	20
33	9	1750	50
34	8	750	20
35	8	1750	20
36	8	7500	300
37	8	1750	20
38	7	1750	20
39	7	1500	0
40	7	1750	20
41	7	1750	20
42	6	3750	50
43	6	1750	20
44	6	750	50
45	4	375	20
46	2	1750	50
47	1	1750	100
48	1	1750	100
Averages:	10·5	1692	54

Class II.: 27 Cases.

Case No.	Months since inoculation.	Macroscopic: serum dilution 1 in—	Microscopic: serum dilution 1 in—
1	19	200	0
2	19	3750	100
3	19	85	0
4	18	750	0
5	18	1500	20
6	17	175	0
7	17	750	0
8	17	375	50
9	17	375	20
10	16	1750	50
11	14	375	0
12	12	750	0
13	11	750	0
14	10	3750	250
15	10	180	0
16	10	750	20
17	10	3750	100
18	9	200	0
19	8	375	0
20	8	375	0
21	7	1750	100
22	6	200	0
23	6	375	0
24	4	200	0
25	4	750	20
26	4	180	20
27	2	1750	50
Averages:	11·6	969	29

Class III.: 22 Cases.

1	20	0	0
2	19	750	20
3	17	1000	50
4	16	750	20
5	15	375	0
6	14	85	20
7	12	375	0
8	12	375	20
9	12	375	20
10	11	3750	100
11	10	750	50
12	10	375	0
13	9	85	0
14	9	375	20
15	9	750	0
16	8	750	20
17	7	750	0
18	6	1750	20
19	5	3750	100
20	5	1750	50
21	4	750	50
22	1	1750	50
Averages:	10·5	974	28

Conclusions.

1. That although comparison of the arithmetic mean of the various series suggests that the effect of febrile attacks is to lower the agglutinin titre, yet, in view of the comparatively small number of cases examined and the wide range of variation in the results obtained, it would be unsafe to draw any definite conclusions. In certain of the investigations already published a comparison has been made between such series of results on the basis of the value of the middle term of each series; it will be seen that such a method of comparison employed in the figures here recorded gives an entirely different result from that obtained by utilising the arithmetic mean, and this may be taken as further evidence that such series are not strictly comparable. It would seem, however, that the mean value offers the better standard of comparison, since a single high agglutinin titre affects to too great an extent the whole results if the middle term be employed. It may be concluded that such a series as the above offers only a suggestion that febrile conditions decrease the agglutinin titre, and more extended investigations must be awaited before a final judgment upon the subject can be passed.

2. That persistence of agglutinins in the serum of a patient who has had a temperature of 102° F. for four days, whether estimated by the macroscopic or the microscopic method, is insufficient to justify a diagnosis of typhoid fever.

3. That the macroscopic method suggested by Dreyer offers obvious advantages when repeated quantitative estimations of the agglutinin titre have to be made.

I should like to express my thanks to Dr. W. W. C. Topley, at whose suggestion this work was undertaken, and by whose kindness I have been able to carry it out.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

CLINICAL SECTION.

Toxic Jaundice due to T.N.T. Poisoning.—Primary Carcinoma of Liver.

A MEETING of this section was held on Feb. 9th, Surgeon-General H. D. ROLLESTON, R.N., the President, being in the chair.

Dr. R. MURRAY LESLIE showed a case of Toxic Jaundice due to T.N.T. Poisoning. The patient, a woman aged 26, after being engaged in handling T.N.T. for about 14 days, noticed that her hair, which was originally fair, had become of a "ginger" colour, but her general health did not suffer in any way, and she continued at her work for a fortnight after the change in the colour of the hair had been noticed. She remained quite well for one month after leaving her employment, although the ginger colour of the hair persisted. At the end of this time, however, she noticed that the skin of the face became yellow, and in about one week the skin of the whole body was similarly affected. This yellow colour gradually deepened, and she stated that the whites of the eyes became tinged later. A fortnight after the appearance of the jaundice she noticed a "cankery taste," lasting for about an hour after taking food. Afterwards she had occasional vomiting, which seemed to relieve the disagreeable taste, and during the same time suffered from diarrhœa—three or four loose and offensive motions daily, very pale in colour. During the same period the urine was very dark—something like the colour of "strong tea." A week before admission a rash broke out over the body. She thought she had lost weight. On admission the hair was of a peculiar ginger-yellow hue, while the skin of the face and body was markedly jaundiced, with similar icteric tinging of the conjunctivæ. There was also a raised erythematous rash—a sort of superficial dermatitis—affecting the skin of the arms, chest, back, abdomen, buttocks, thighs and legs, producing, in association with the jaundice, a curious bronzed appearance. This erythema was accompanied by some irritation. The bowels tended to be relaxed and the motions were of a pale pipe-clay colour, but there was no actual diarrhœa, which had been present during the previous fortnight. The urine was of a dark brownish-green colour, and contained bile salts and bile pigments, and also a slight amount of albumin. Acetone was also present during the first ten days, but was not found in subsequent examinations. The specific gravity was 1020 and the reaction acid. Blood, tube casts, leucin, and tryosin crystals were not found. The liver dullness seemed slightly reduced and did not extend quite so far down as the costal margin, but there was no definite pain or tenderness on palpation. The temperature on admission was 99·4° F. and the pulse 100. Her weight was 8 st. 6½ lb. For the first three days the patient remained *in statu quo* and was not obviously ill or distressed. On the fourth day after admission, however, she got much worse, and her condition gave rise to considerable anxiety. The temperature rose to 102·4°, and there was remittent pyrexia for the next five days, the evening temperature on the sixth day after admission being 103·8°. There were no drowsiness, convulsions, or other alarming nervous symptoms, and no actual distress. She was indeed bright and cheerful throughout. Acetone at this time was present in the urine. After a week's pyrexia the temperature fell to normal, and with the exception of occasional rises of temperature in the evening to 99·4°, and on one occasion to 100°, there was no pyrexia during the rest of the patient's stay in hospital. The erythema disappeared within the first 14 days. The jaundice persisted unchanged for the first three weeks and then gradually diminished. The albumin disappeared from the urine. During the first three weeks the patient lost 6 lb. in weight, which she regained in the next fortnight. There was complete amenorrhœa for three months. After her discharge from the hospital she remained well except for an attack of epistaxis and diarrhœa, but slight jaundice persisted. The presence of acidosis, in association with pyrexia, during the first ten days suggested the administration of alkalies. Half-drachm doses of bicarbonate of soda were given every two hours during the day for eight weeks, after which the same doses were given every four hours. When the pyrexia subsided the patient was put upon ordinary diet, with an excess of carbohydrates. The alkaline treatment was suspended during the past month, but since the recent attack of diarrhœa and hepatic pain it had been resumed in drachm doses three times daily.

Dr. F. PARKES WEBER read a short paper on two cases of Primary Carcinoma of the Liver. The first was an example of "cirrhosis carcinomatosa," the neoplasm originating from the hepatic cells in a cirrhotic organ. In the other the growth was of the "massive" type, probably originating from the epithelial cells of small intrahepatic bile-ducts. Before death thrombosis of the whole of the inferior vena cava occurred.

MEDICAL SOCIETY OF LONDON.

Naval Medicine in the Great War.

A MEETING of this society was held on Feb. 12th, Lieutenant-Colonel D'ARCY POWER, R.A.M.C. (T.), the President, being in the chair.

Surgeon-General H. D. ROLLESTON gave an address entitled "Naval Medicine in the Great War," which is published in full in our present issue.

Surgeon-General Sir ARTHUR MAY, D.G., R.N., spoke of the high standard of health in the Navy and paid a glowing tribute to the civilian medical men of all grades who had joined the Royal Naval Medical Service during the war. He especially emphasised the self-denial of the surgeon-probationers and the excellence of their services.

Dr. F. W. MOTT said that as regards mental trouble among soldiers he had found that usually there had been some antecedent condition of nervous instability. Shell shock also occurred in those of a temperamentally nervous disposition. He was interested in what had been said about nitrous oxide fumes, and had recently received a brain, preparations of which showed that there had been a profound effect upon the blood, the hæmoglobin being probably converted into methæmoglobin. The speaker regarded the process of adaptation as the main factor involved. The state of adaptation was the barrier by which perceptions liable to arouse the primary instincts were prevented from arising in consciousness to their true significance. Once adaptation had failed, or a vivid perception had pierced through and succeeded in arousing the primary instincts, the path was laid open for succeeding ones of less strength, and the consequence was that the individual had to maintain his normal level against an ever increasing load of mental stress. By various psychological processes the eventual production of any one of the clinical types could be explained, each individual case, of course, depending on its special attributes. The development of the various conditions demanded time, and this was afforded by the special conditions of modern naval warfare—the long periods of purely routine work with a constant anticipation of real action. The remarkable feature was that the average man should be capable of adaptation to such a degree as to enable him to withstand such conditions over so long a period as he did. It would not be possible were it not that in the process of civilisation a number of secondary instincts had been produced which acted in opposition to, and helped the individual to overcome the promptings of, the primary instincts; these were the herd instincts, such as the instincts of duty, morality, &c., and the religious instinct. In a ship the close relationship between individuals necessitated by the confinement of space tended to the production of a specialised herd instinct, usually termed the morale. Where the morale was strong the individual was saved from a great deal of the mental stress to which he might be subject, and cheerfulness and confidence with mental stability resulted. It could safely be stated that the morale of our ships at sea had lost nothing of its high degree since the war began, long as the time had been and however unmentioned the task. The very small relative increase in the numbers of the cases was due to the decided difference between conditions of peace and of war and to the unpreventable inclusion of a few less constitutionally sound individuals in the greatly enlarged personnel of the service.

Dr. THOMAS BEATON Temporary Surgeon, R.N., referred to the Neuroses and Psychoses of the Sailor at War. The number of cases of this description admitted to the Royal Naval

Hospital, Chatham, had steadily increased until, in the last quarter of 1916, the admissions were six times the average quarterly admissions in peace-time. The relative incidence to the total number of medical cases admitted, however, had only increased by 2 per cent. each year of the war. 60 per cent. of the cases showed conduct which could be termed insane, the remaining 40 per cent. consisting of the pure neuroses and the psycho-neuroses. The clinical types of insanity did not differ to any great extent from those observed in civil practice. General paralysis, which occurred to the extent of 5 per cent., almost invariably showed a marked dementia rather than any definite delusional state. Cases of non-systematised delusional insanity, which were the most common, had a tendency towards rapid recovery under the influence of hospital life and the removal of circumstance of stress. There was generally a condition of congenital defect underlying the delusional content. The types of neuroses differed to a certain degree from those occurring in civil life. True neurasthenia was very rare, whilst hysterical states, mutism, functional paralyses, &c., were extremely infrequent and only seen in cases of a previously hysterical nature. The majority of the cases were of a type bordering on the neurasthenic on the one hand, and on the obsessional case on the other, showing distinct mental aberration but little derangement of the general bodily condition. This condition, termed "psychasthenia" by the speaker, occurred in association with congenital mental deficiency in the youth and the young adult, with senile and atheromatous change in the middle-aged and old adult, and between those ages almost invariably followed on a period of especially arduous stress. The fact that mental disturbance was the common feature of the whole series of cases indicated that the cause would ultimately be expressed in psychological factors. The actual severity of the circumstances under which the conditions developed did not necessarily indicate the extent of the mental disturbance to be produced, but obviously bore an inverse ratio to the resisting power of the individual.

Dr. A. F. HURST said that overactivity of the suprarenal glands could account for a large proportion of the ordinary manifestations of fear and anger. These were in the nature of preparation for action, and if too prolonged exhaustion of the suprarenal glands (and possibly of the thyroid) occurred. This explained the low blood pressure met with after serious illnesses in soldiers, a pressure which gradually improved as the cases got better. There was an overaction of the thyroid and suprarenal together in cases of apparent hyperthyroidism, and the blood pressure was higher than one would expect with simple overactivity of the thyroid. With rest, bromide, &c., the pressure fell. The cases of tabes and general paralysis brought on by shock and strain improved so much by treatment that he had been almost tempted to send them back to service. This he ascribed to the fact that they were secured in a very early stage. For war-dreams he had found hypnotism very successful, even one treatment sometimes causing their cessation. It was important that it should be employed at night so that the patient could afterwards be left to sleep until morning. He regarded the doubtful intestinal cases met with in the Mediterranean as examples of true dysentery, for it had been his experience that in all cases in which mucus and blood were present in the stools, the amœbæ were found. Large injections intravenously of serum had proved remarkably successful. Of the beri-beri cases seen, the majority had had jaundice and the remainder some gastro-intestinal symptoms. He favoured the view of Hamilton White that the jaundice was due to duodenal infection, which was followed by a toxic neuritis as in the case of diphtheria.

JOURNALS.

Indian Journal of Medical Research, Vol. IV., No. 2.—The first article in this number is a note on the tests for certain narcotic and anæsthetic drugs, by Dr. E. H. Hankin, chemical examiner to the Government of the United Provinces of Agra and Oudh. A recent Army Council Order restricts the sale of some of these drugs to soldiers, and as no tests were known, or at least generally known, for some of them Dr. Hankin is right in thinking that his "Note" may prove of service.—Mr. C. Strickland, travelling medical entomologist, Federated Malay States, contributes three papers, the first of which gives interesting observations on the epidemiology of malaria fever in the Malay Peninsula. The author advances what he terms an "epidemiological paradox"—namely, that while on the alluvial coast-belt malaria is incident on proximity to undrained jungle, in the hills and mountains malaria would not appear to be so incident; conversely, health results on the flat coast if the jungle be felled and drained; in the hills, if land be cleared and drained, malaria becomes prevalent. This means, in Mr. Strickland's opinion, that *A. umbrosus*, which causes malaria on the flat coast-belt land, will not breed in the hills, and that *A. maculatus* and others which cause fever in the hills will not breed on the coast alluvium. Exactly why this is so is now being investigated, and will be reported upon in due course. This paper was laid before the Federal Council of the Malay States by command of His Excellency the High Commissioner, and is reprinted in the *Journal* by permission. In his second paper Mr. Strickland describes a new species of Protanopheline from Malaya—*Myzorhynchus hunteri*; and in his third article he gives a description of a new species of umbrosus-like anopheline from Malaya—*Myzorhynchus novumbrosus*.—Major Clayton-Lane, I.M.S., contributes an interesting report on an investigation into ankylostoma infection in 11,000 inhabitants of the Darjeeling district. This inquiry was made with a view to determine the amount of the infection present among these people and with the object of freeing them from the disease, as well as for the purpose of observing what effects this had upon the health and working efficiency of such persons. The investigation was conducted upon the coolies engaged in several tea-gardens. The results showed that 66·02 per cent. of those examined were infected by *Necator americanus*, the only kind of ankylostoma present in this part of India. Incidentally infestation by other parasitic intestinal worms was revealed, 67·68 per cent. having *Ascaris lumbricoides*. A further report upon his inquiry is promised by Major Clayton Lane at a future date.—The Gland-Index in Tuberculosis is the title of a paper furnished by Dr. A. C. Lankester, giving some results observed by him in the course of his special tuberculosis inquiry in India. It has been suggested that it may well be that the proportion of enlarged cervical glands, tuberculous in origin, may be sufficiently large to determine a true correlation between the percentage of children showing enlargement of these glands and the number of cases of phthisis in the community to which they belong. If such a correlation can be established then the examination of children in various schools would seem to afford a very ready means of measuring the degree of prevalence of tuberculosis in their homes, and thus a comparison of cities and districts with one another as regards prevalence of consumption might be instituted, as also of various social and religious communities throughout the country. In his inquiry Dr. Lankester examined over 900 children and found 29·49 per cent. with enlarged cervical glands, but he was forced to the conclusion that the gland-index method needs to be further safeguarded before it can be regarded as suitable for general adoption as a means of measuring tuberculosis prevalence; the method, however, is well worthy of continued investigation, and he hopes to have the opportunity of testing it again in several directions.—Major W. F. Harvey, I.M.S., contributes two papers, the first being entitled "Some Facts Relating to Birth and Marriage Rates among Brahmins" and the second "Birth Rates, Marriage Rates, Fertility and Proportion of Sexes at Birth among some Fighting Communities." Both of these papers are supplemented by statistical tables.—A note on the effect of inoculating rabbits with cholera vaccine prepared in various ways is supplied by Captain C. J. Fox, I.M.S., who undertook this work in order to ascertain the relative value of different kinds of cholera vaccine which would combine a high immunising power with a minimum of local and general reaction. This, it appears, was called for, as the cholera vaccine prepared by Professor Haffkine produced a severe general and local reaction. The results showed that from the point of view of agglutinative power the most effective immunising vaccine appeared to be a heated one without phenol; and from the point of view of efficiency combined with minimum reaction the choice appeared to be in favour of a carbolised vaccine.—Captain A. L. Sheppard, I.M.S., gives an account of his experiences of scurvy in Zhob, Baluchistan, discussing also the clinical characters and etiology of the disease. He found that the seasonal prevalence corresponded exactly in this district with food scarcity, especially of vegetables, fresh meat, and milk. He is, however, led to ask, Is scurvy entirely due to deficiencies of diet, or is this only a predisposing cause?

THE LANCET.

LONDON: SATURDAY, FEBRUARY 17, 1917.

The Medical Department of the Navy in the War.

THERE is always a pleasure in examining a great and complex mechanism, in seeing how it moves, and how the various parts have been adapted, each for its own purpose. Just such an insight into the working of that elaborate machine, the Medical Department of the Royal Navy, was given us by Surgeon-General H. D. ROLLESTON in his address to the Medical Society of London on Monday last, which is printed in the present issue of THE LANCET. Before the war the Navy included more than a hundred thousand persons in all ranks, but with the outbreak of hostilities its personnel was enormously increased—we believe that no official figures have been published but it is well known that there are now at least half a million men holding permanent or temporary positions within the Navy, a number that must be quite unprecedented in the navies of the world. With the expansion of the numbers of the Navy it was clear that the Medical Department must increase also, and at even a higher rate, for with active service the need for medical and surgical assistance undergoes enormous increase. Up to the present no great sea fight, commensurate with the size of the opposed fleets, has occurred, but there have been sick and wounded, amply sufficient in number to test the working of the elaborate arrangements which have been made for their care and treatment, and numerous enough also to show how wise the naval authorities have been to expand the Medical Service vastly in preparation for worse things.

The system which the necessities of war have evolved has been dependent on what may seem, until circumstances change the point of view, an excess of preparation, and herein lies the interest of the more striking points in Surgeon-General ROLLESTON'S address. First, as to the staff. A large number of temporary surgeons were enrolled, and in addition ten consultants were appointed, most of them to serve in the main base hospitals, with pathologists to carry on their duties in the clinical laboratories. In addition to these a new rank of medical service was devised. In peace time the smaller ships, such as destroyers, are not provided with any real medical attendance. Some of the officers and men have a certain amount of knowledge of the administration of first-aid in emergencies, and such knowledge has been found in practice to be sufficient. Indeed, many of the destroyers for a great part of the present war have had no surgeon on board. To remedy this deficiency the Medical Department of the Navy has appointed medical students who have passed in anatomy and physiology but have not passed their final examinations, and has called them surgeon-probationers. They have been given some training at Haslar and they have proved their usefulness on many occasions. The question of the transport of the sick and wounded has also received particular attention, as would be expected when the conditions of naval casualties are considered. Four naval ambulance trains have been provided, and carry the patients from the ambulance ships and the naval hospitals near the naval bases to the large naval hospitals at Plymouth, Haslar, and Chatham. An excellent plan has been devised by Sir JAMES PORTER and Staff-Surgeon A. V. ELDER by which the Service cot, in which the patient is brought from the ship, is fixed firmly in the train, so that there is no necessity for transferring him from a stretcher to a cot in the ambulance train; this must save an enormous amount of discomfort and pain. The present great speed of the units of a battle fleet makes it practically impossible for a hospital ship to keep in touch with the fighting ships during a battle, and, moreover, in the midst of a battle a battle-ship or cruiser cannot heave to for the purpose of transferring the wounded to the hospital ship, for that would be to expose the ship to the risk of a torpedo. The hospital ship can only come into use after the action has ceased, and this is the fact that has been kept steadily in view by those responsible for the organisation. It is difficult to give any exact statistics as to the proportion of killed and wounded in modern naval actions, for when several ships are sunk it cannot be said how many of the crews have been killed by the enemy's fire and how many drowned, but on the whole the proportion of killed has been high. The amount of shock in the wounded seems to have been great, and immediate operation is therefore to be avoided as far as possible, while for the relief of shock the value of hypodermic injections of morphia appears to have been proved. The Royal Naval Division have seen active service in Belgium, Gallipoli, and France, and therefore have been exposed to the same risk of disease and injury as the armies with which they have worked.

To turn from wounds in battle to the incidence of disease, the amount of sickness in the Fleet has been wonderfully small, less even than in times of peace. With regard to infectious diseases, the most striking and noteworthy point was the severity of measles amongst the Shetlanders both in the Fleet itself and amongst the reservists stationed on shore. In the Orkney Islands Dr. R. P. HEDDLE, of Kirkwall, states that measles may be entirely absent for 15 or 20 years, but when the disease does appear, though the children have mild attacks, the adults take it very severely and seem to be especially liable to have pneumonia as a complication. The good health of the men is doubtless to be attributed mainly to the isolation of the Fleets, so that the risks of venereal infection and alcoholic excess were reduced to a minimum, but some of the improvement must certainly be attributed to the lectures delivered by the medical officers to the crews, dealing with the dangers alluded to. The monotony of waiting for

actions which never appear to come was anticipated by the authorities. It has told, we believe, far more hardly upon the officers than upon the men, among whom it has been in great measure obviated by means of regattas, boxing competitions, and other entertainments. Cinema shows have also been very useful, and a scheme has been devised for circulating films between the various ships. Great credit must be given to the arrangements which have been made. It was, however, the Naval Division in Gallipoli which suffered most from sickness; dysentery, diarrhœa, typhoid, paratyphoid, and jaundice all caused a large amount of invaliding, as has been made clear in many communications to our columns. Surgeon-General ROLLESTON discussed in his paper many of the points in connexion with these diseases, and the conclusions which he drew, as well as his brief account of the diseases incident to the Naval Air Service, will be received with pleasure. Altogether the paper was wonderfully instructive and interesting, and showed the success of the organisation of the Naval Medical Service.

Tuberculosis and the War.

A YEAR ago a symposium in the *British Journal of Tuberculosis* afforded an occasion to consider the treatment of tuberculosis and the effect of the war upon the methods of carrying it out. Active measures had already necessarily been much curtailed, but we pointed out the necessity of unremitting attention to the public health aspect, especially the conveying of infection from person to person in the close contacts of poorer city life must be avoided. Equally important we felt to be the treatment of the earlier stages of tuberculosis which are preëminently curable in the growing child. At that time the effect of war conditions on the tuberculous soldier himself was largely a matter of conjecture, but it seemed, at all events, probable that the healthy outdoor life with abundant food and exercise in the fresh air was meaning for the sometime industrial worker an improvement in his chance of keeping the upper hand in a personal struggle with the tubercle bacillus. A year has passed away and the effect is still conjectural, but there are certain indications as to the directions in which progress may be looked for, and another symposium in the *British Journal of Tuberculosis* affords at the moment valuable information.

Taking first the tuberculous soldier, it is evident, we think, that camp and trench life has not been productive of more breakdowns than would have occurred in civilian employment. Dr. T. D. ACLAND, in a contribution to the symposium, quotes Mr. TENNANT'S statement in the House of Commons that up to March 1st of last year 2770 tuberculous soldiers had been discharged from the Army. It is a matter of common knowledge how reckless was the admission to the Army in the early days of men with clinical signs of tuberculosis, and the number of such will, of course, only amount to a tithe of those with latent or hardly recognisable disease. It is amazing that in a citizen army running to millions the incidence of breakdown from tuberculosis all told should have been only in the lower thousands. A rough calculation of breakdown from the same cause among the men of military age in industrial occupations would give a vastly higher total. This stands out as an encouraging factor in a vastly perplexing situation, and we reiterate the hope we expressed a year ago that the accustoming of the industrial population of this country to a habit of open-air life may be a permanent health asset in the future. With regard to the treatment of the discharged tuberculous soldier, Dr. ACLAND notes the fact that nearly one-half of these 2770 unfortunates had not received a pension. We have already commented on this glaring inequality of treatment, and we believe that the present Pensions Minister will not be content to allow its continuance. Now that for six months the Recruiting Boards have been categorically forbidden to take into the Army men who have been under treatment in a sanatorium or been notified as suffering from consumption, all men discharged from the Army suffering from tuberculosis must be regarded as having contracted their disability, if not their disease, during service, and should in justice be put in the way of earning their living again. No rigid scheme of pensions will cover these cases in common with the cases suffering from other physical disabilities. Dr. J. LUMSDEN tells us that as far as Irish soldiers are concerned they have probably all been offered sanatorium treatment before discharge from the Army but have generally refused such treatment. Dr. ACLAND holds that the sanatorium treatment should be voluntary and preceded by a period of furlough, but the chance of refusal and the discouraging experience of giving furlough to men discharged from military hospitals before entering convalescent camps are weighty reasons against it. Dr. LUMSDEN therefore would retain the tuberculous soldier in the service, compel him to go to a sanatorium, and not discharge him until he should be in a condition to take up work, suggesting an agricultural colony as an aid to the solution of the problem. We may remind our readers that Dr. E. H. R. HARRIES, whose contribution to the problem of the tuberculous soldier we published in THE LANCET of Dec. 2nd last, came to much the same conclusion from his study of more than 100 soldiers admitted to the Beechwood (Newport, Mon.) Tuberculosis Hospital for Soldiers. Dr. HARRIES summarised his points thus: (1) That sanatorium accommodation would be of much greater value if discharge from the Army were deferred; (2) that it should be followed by a further period of some months on a farm colony.

Light also is dawning on the general question of the treatment of tuberculosis in civil life. Even before the war it was beginning to seem impossible to lodge and feed at the expense of the National Insurance or other funds all the bearers of a chronic pulmonary lesion. Now, under the financial stress and lack of personnel due to the war, local authorities all over the country are failing to cope with their legal obligations to the chronic consumptive, and tuberculosis dispensaries have long, often

impossibly long, lists of patients waiting to go into sanatoriums. But the chronic case is not a responsive occupant of sanatorium beds, and the results do not seem to justify his preponderance there. A report just received by the North Riding Insurance Committee is typical of many others. Dr. D. DUNBAR assures the Committee that only about 5 per cent. of the inmates of the Aysgarth Sanatorium are permanently benefited, and it is becoming clear that sanatorium treatment in the strict sense is not even necessarily the best treatment for the chronic consumptive. Belief is steadily gaining ground in the increasing value of dispensary treatment at the hands of an expert tuberculosis officer and of domiciliary treatment by the panel doctor when the advice and collaboration of an expert are available. The Local Government Board evidently had this in mind in the recent issue of the Order for domiciliary treatment, which came into force at the beginning of this present year. This value is strikingly brought out by Dr. HENRY A. ELLIS, who relates in the same issue of the *British Journal of Tuberculosis* his favourable experiences of dispensary work in a large northern manufacturing town, contrasting them in frank surprise with his previous work at Coolgardie, in Australia, under vastly better conditions of fresh air and climate. He notes that for the working population surprisingly little increase of care is sufficient to re-establish their normal powers of resistance, and he is driven to the conclusion that the rigour of a scientifically directed tuberculosis treatment may be materially modified and reduced in most early cases in favour of a carefully conducted supervision of home conditions. Opinions supporting a similar view are expressed in the symposium by Dr. G. A. CRACE-CALVERT, who holds that the real treatment comes after the sanatorium when the patient has returned to home and work, and Dr. CECIL WALL, who emphasises the necessity for provision of satisfactory living conditions for those who have left sanatoriums and for laying more stress on the common-sense adaptation of their limited output of physical energy in the pursuit of a livelihood.

How real is the Scottish awakening to the dangers of tuberculosis is well illustrated by two occurrences in the House of Commons this week. A Supplementary Estimate for £27,000 has been laid before the House for the treatment of tuberculosis in Scotland, while a University Court Ordinance has been presented for the foundation in Edinburgh of a Chair of Tuberculosis.

THE LANCET, VOL. II., 1916: THE INDEX.

OWING to the continued shortage in the paper-supply the Index and Title-page to the volume of THE LANCET which was completed with the issue of Dec. 30th, 1916, have been printed separately, and copies have been supplied gratis to those subscribers who have intimated to us their wish to receive them. Other subscribers will be similarly supplied, so long as the stock remains unexhausted, on application to the Manager, THE LANCET Office, 423, Strand, London, W.C. Such applications should be sent in at once.

Annotations.

"Ne quid nimis."

THE NEW YEAR HONOURS.

THE list of honours issued at the beginning of the year was a small one, and included the names of no medical men in their civilian capacity. A supplementary list issued early this week by the Prime Minister includes the names of Dr. Robert Armstrong-Jones, consulting physician on mental diseases to the Military Forces in London, who has received a Knighthood; Dr. Arthur Newsholme, C.B., Chief Medical Officer to the Local Government Board, who has been promoted to a Knighthood in the Order of the Bath; and Sir Robert William Burnet, physician to His Majesty's Household, who has been made a Knight Commander of the Royal Victorian Order. In the Foreign Office list appear the names of Dr. John Warnock, Director of Lunatic Asylums, Egypt, and Dr. William A. Betts, Director of Municipal and Local Committees of Egypt, both of whom have received a C.M.G. We offer these gentlemen hearty congratulations. Well-deserved honour has also fallen to Mr. E. M. Clarke, head of the motor ambulance department of the Red Cross, and to Mr. J. Grice, a well-known philanthropist and chairman of the Melbourne Hospital, who have received knighthoods; and to Mr. J. G. Griffiths, honorary secretary of King Edward's Hospital Fund for London, who has been promoted a C.V.O. Mr. L. J. Otter, Mayor of Brighton from 1913 to 1916, played a leading part in connexion with the war charities of the town, and his Knighthood is thoroughly well earned.

A RARE FORM OF WAR NEUROSIS.

THE latest number of the *Nouvelle Iconographie de la Salpêtrière* (No. 1, 1916–1917) contains a well-illustrated article by Madame Rosanoff-Saloff on a curious and uncommon condition supervening in certain neurotic subjects as a result of war trauma, mental or physical. This consists in a marked spinal curvature in an anterior direction, so that the patient comes to resemble the "Man with the Muck-rake." Similar cases have been also observed in this country. With this prominent anterior flexion of the trunk there is occasionally seen a lateral inclination. Dr. Souques, of the Hospice Paul Brousse at Villejuif, in whose neurological service the cases have been observed, proposes the term "camptocormia" for the condition, from κάμπτω to bend, and κορμός the trunk. From the clinical point of view the attitude of the patient is identical with an anterior flexion of the trunk in a normal individual; in all cases, however, he exhibits transverse skin folds on the back of the neck from an effort to hold the head up and so augment the visual field and facilitate walking. The abdominal muscles can be seen to be strongly contracted underneath the skin. As a rule, most movements of the trunk can be executed with comparative ease, except that of extension or posterior flexion, an effort to perform which often results in a typical generalised tremor of the lower extremities. On the other hand, the majority of the cases can lie flat on their back in bed, and this dorsal decubitus is not even painful. If the patient, further, is put on his face in a recumbent position he can on request raise his head, showing that extension can in reality be

performed. As a fact, the spinal column is supple enough, nor is there any evidence of local vertebral pain or sensitiveness, with the exception of that produced by pressure and palpation of the lumbar musculature on either side. No other abnormality of the nervous system is found, while radiographic examination is invariably negative. The cerebro-spinal fluid is normal. Madame Rosanoff-Saloff has examined some 16 cases of this neurosis and divides them into two categories—those with actual wounds and those without. Only two of the series belonged to the first of these groups, and in them the wounds were far removed from the seat of the abnormal flexion. The great number of the other group occurred in soldiers who had been blown up by a shell or buried, with a loss of consciousness of variable duration. Occasionally actual lumbar ecchymoses were noted. In all the earliest symptom was lumbar pain, violent and continuous and aggravated by movement. From the point of view of pathogenesis it may be mentioned that the sole position of comparative comfort adopted voluntarily by such patients is that of bending the body forward till the head is between the knees. After some weeks of gradual relief from the pain they declare that they cannot get their back straight again, and all sorts of local treatment are as a rule unavailing. The persistence of the attitude is explained by the fact that the subjects of the affection are without exception neuropaths. The normal subject cannot adopt such forced positions for long because of their discomfort, whereas the neuropath maintains the attitude from ideational inertia or from auto-suggestion. Madame Rosanoff-Saloff states that the prognosis is perfectly good provided the patient is removed from the surroundings of the ordinary hospital, where little or nothing is likely to be done to combat the peculiar mentality on which the neurosis is erected. She pleads earnestly for the removal of such patients to special neurological centres at the front itself (dans la zone des armées), where appropriate medical treatment with rigorous military discipline soon effects the best results. The suggestion is made to place the patient in a plaster jacket, with or without an anæsthetic, keeping it in position for 8, 10, or 15 days. This treatment, coupled with an atmosphere that of itself suggests cure, and proper discipline, succeeds without fail, according to Madame Rosanoff-Saloff's experience. We find ourselves in entire agreement with the proposal that these and analogous cases should be treated at the front, in a military-medical environment, and not allowed the chance of becoming perpetuated by wandering from one hospital to another at home, where it is a mere chance they may meet with a physician who is sufficiently interested or leisured to devote himself to a cure. As Charcot said, "il ne faut pas laisser flâner les contractures hystériques."

THE WORK OF THE BELGIAN WAR REFUGEES COMMITTEE.

AMIDST the chaos of passion which war produces the organisation of charity has been particularly noticeable since the commencement of hostilities, and in no way more so than in the attempts to relieve the Belgian sufferers. When, by the ruthless destruction of Belgian towns, thousands of children, women, and men were rendered homeless and sought succour and shelter in this country, offers of help came from all parts and from all classes, and in London so great was the demand to be of service that at one time the number of volunteers for work outnumbered that of the refugees. The report of the War Refugees Committee dated August, 1916, has just been issued, and tells the story of an organisation carried out under the greatest difficulties which has provided wholly or in part for some 300,000 out of probably 250,000 Belgian refugees who have entered this country since the beginning of the war. At the end of 1914 there were 2000 local committees engaged in the work, though this number has since been decreased to 1837. The offers of hospitality received by the various local committees made provision for some 150,000 people, while up to February, 1915, the Board of Trade Labour Exchanges had found work for 8752. The health department, which deals with hospital and convalescent treatment, maternity cases, the provision of surgical appliances, and the investigation of consumptives, has ministered to 2550 cases, the weekly average of new cases being 45. At the dispensary, which is managed by a committee of English and Belgian doctors assisted by a Voluntary Aid Detachment, 20,852 patients have received attention and 14,243 prescriptions have been dispensed at an average cost of 4*d.* per head. The domiciliary visits made numbered 550, the surgical appliances provided amounted to 518, and 2200 letters of recommendation to hospitals and other institutions were procured.

SHELL WOUND OF THE PREGNANT UTERUS.

UNDER the title "Cæsarean Section due to a Shell Fragment," MM. Saint, Goehlinger, and Poiré have described a remarkable injury due to the war of a kind which, fortunately, we are spared in this country. A woman, aged 33 years, in the sixth month of pregnancy, was taken to hospital. She lived in a town behind the British lines which was daily bombarded. While seated at her window a shell exploded in the street and wounded her in the lower abdomen. She was admitted three hours later. The abdomen was distended and a reaction of "peritoneal defence" was already marked on the right side. The uterus extended two finger-breadths above the umbilicus. The position of the fœtus could not be ascertained by palpation because of the pain produced by examination. There was a wound of entry a little below and to the left of the umbilicus and one of exit 9 cm. away, two finger-breadths above the left crural arch. From each wound omentum projected. On palpation it was evident that the abdominal muscles were completely divided and that between the two wounds only a bridge of skin remained. Blood was abundantly escaping from the vagina. A digital examination was not performed. The pulse was 110 and good, and the general condition satisfactory. Operation was decided on. The bridge of skin between the wounds was divided and the usual median incision for laparotomy made below the umbilicus. This with the wound due to the injury itself gave a large triangular flap with its summit at the umbilicus. A wound in the fundus uteri, 5 cm. long, was found running from the middle line downwards to the left and forwards. Amniotic fluid and meconium were free in the pelvis. Without separating the edges of the uterine wound the lumbar region of a fœtus could be seen on which a small wound was visible. A median incision in the uterus allowed a flap similar to that in the abdominal wall to be detached

and the fœtus and placenta to be removed. As the fœtus was thought to be dead attention was confined to the mother. The uterine cavity was cleaned out, the hæmorrhage arrested, and the uterus sutured. After rapidly examining the coils of intestines the abdominal wounds were closed. At this moment the fœtus, which had been left in a basin, began to cry. It was a female weighing 950 grammes and had a superficial wound 2 cm. long in the left sacro-lumbar region. After a warm bath the child was enveloped in cotton-wool, but only lived for 15 hours after the injury. The mother recovered without untoward incident. Evidently the gravid uterus prevented deeper penetration of the shell fragment into the abdomen and perforation of the intestine. The presence of the fœtus may be held to have saved the life of the mother.

RESTRICTIONS ON THE USE OF MEDICINAL GLYCERINE.

THE Ministry of Munitions announces that owing to additional demands for glycerine for war purposes it has become necessary to place further restrictions on the issue of medicinal glycerine, and that supplies in future will be reserved for the manufacture of the preparations of the British Pharmacopœia, and for such uses of special importance as may be sanctioned by the Ministry of Munitions. These supplies will, however, be small and must be used with the utmost economy. Applications for permission to obtain supplies should be addressed to the Director of Propellant Supplies, 32, Old Queen-street, Westminster, S.W., and should give the following particulars: 1. Quantity applied for. 2. Stock of glycerine held. 3. Purpose for which supply is required. (In case of Extra British Pharmacopœia preparations formulæ should be given.) 4. Applicant's average yearly consumption of glycerine for above purposes. 5. Name and address of proposed suppliers. The medical profession have been informed of the need for economy in prescribing glycerine, and it is anticipated that the requirements for dispensing will be greatly reduced. The stocks of glycerine in the hands of pharmacists should be sufficient to meet these reduced requirements, and therefore no glycerine will be issued for dispensing meantime. The surplus stocks held by pharmacists, and all stocks held by retailers who are not in a position to use them for these restricted purposes, should be disposed of either to other pharmacists who are short of stock or to wholesale houses for making B.P. preparations. We published a note last week on the importance of economising glycerine for medicinal use, and there can be little doubt that in many cases it can be replaced for dispensing purposes, without material disadvantage, by other substances.

THE DRESSING OF BURNS WITH PARAFFIN WAX.

Sir Arthur May's prompt application of the remedy to the requirements of the Navy has drawn fresh attention to the treatment of burns by a proprietary preparation called ambrine by its inventor, Dr. Barthe de Sandfort. As, however, the preparation is a secret one controlled by a company in Paris, the treatment is not as readily accessible as some of our correspondents desire. We can refer these to the experience of Lieutenant-Colonel A. J. Hull, R.A.M.C., who stated in the *British Medical Journal* of Jan. 13th that the results obtained by a mixture of home manufacture in a military hospital have surpassed those obtained by the use of ambrine or any other preparation. He gives the following formula for its preparation:—

Resorcin	1 per cent.
Eucalyptus oil	2 ,,
Olive oil	5 ,,
Soft paraffin	25 ,,
Hard paraffin	67 ,,

The hard paraffin is first melted and the soft paraffin and olive oil are stirred in. The resorcin is next added dissolved in half its weight of absolute alcohol, and finally the eucalyptus oil when the wax has cooled to about 55° C. If necessary, the resorcin may be replaced by a quarter of its weight of β-naphthol. Colonel Hull adds that the application of this No. 7 paraffin, as it is called, to ulceration following frost-bite has been as successful as in the case of burns. Other uses will doubtless suggest themselves for a soft impervious casing to wounds which can yet be readily peeled off without pain or disturbance to the delicate processes of repair.

BORIC ACID IN CREAM.

IN our issue of Oct. 28th, 1916, we referred to the Amending Order issued by the Local Government Board in regard to the use of preservatives in cream. The Order, as is now announced by the Local Government Board, comes into operation on April 2nd next. It temporarily forbids an addition of boric acid to cream of more than 0·4 per cent., but a small expert committee is to be appointed to inquire further into the desirability of using boric acid at all. In the meantime dealers are asked to make every effort to reduce the preservative to the smallest possible amount, or even to dispense with its use entirely. Until the results of the promised inquiry are known all prosecutions will be avoided in respect of the sale of preserved cream which complies with the Regulations as now amended. Further restrictions may possibly be made dependent upon the findings of the committee referred to. Instructions are issued as to the form of label which such preserved cream must bear. The presence and amount of boric acid must be declared, and the words "Not suitable for invalids" are to be added. A similar provision applies to the use of peroxide of hydrogen as a preservative, except that the amount present is not demanded to be stated.

THE SCIENTIFIC STUDY OF HYDROLOGY.

Dr. Fortescue Fox's paper on "The Future of British Spas," read last week before the Royal Society of Arts, was in effect a plea for the scientific study of physical remedies. He reminded his audience of the memorial laid before the University of London a few days before the outbreak of war, recommending the establishment of a University chair in medical hydrology and medical climatology, a proposal which was still before the Senate. Systematic teaching regarding the action and uses of waters of every kind, both within and without the body, is now available in other European countries. An institute of hydrology has recently been attached to the Collège de France. And it was the opinion of the memorialists in 1914 that authoritative teaching should be provided in London, as

the capital city of an Empire rich in climatic resorts and medicinal waters, for senior students and practitioners likely to specialise in this branch of practice, as well as for medical men who came from the country or from distant parts of the Empire. Laboratory facilities for research work upon British soil are also desirable. These considerations, already urgent in peace, had gained, Dr. Fox alleged, in weight and force from the experience of the war. He alluded to the place which physical remedies were taking in the restitution of disabled soldiers, and pictured a further extension of highly specialised forms of treatment. But where, he queried, were the specialists to be found? The "whirlpool bath" has found wide use for stiff and disabled limbs, and the success of the large "sedative pool" bath has been considerable in disordered action of the heart; but it is a mistake to suppose that one or two methods are applicable to all conditions, and the need of trained men who have studied the principles and practice of hydrological medicine is an immediate one. With Dr. Fox's views, as we have summarised them, we are in substantial agreement. The command depôts up and down the country are already giving striking ocular demonstration of the value of hydrological methods when dealt with on a scientific basis. The war has given a much-needed stimulus to this study, and the results will doubtless remain as a permanent therapeutic asset. Our British spas with their cool and bracing climate may well offer our friends across the Channel, as Dr. Neville Wood pointed out some years ago, a pleasant and healthful change from the heat of the continental summer. Well equipped with scientific practitioners of the whole art of applying water, they should offer a great and increasing attraction.

TYPE-READING BY SOUND.

AT the Röntgen Ray Society on Feb. 6th Dr. Fournier d'Albe demonstrated before a large audience an instrument which he has named an optophone, whereby, with practice, blind persons are, he says, enabled to read ordinary print by sound. The instrument depends upon an application of selenium, and before describing it the demonstrator dealt in a general way with the properties of selenium itself, which was discovered exactly a hundred years ago by Berzelius. He instanced many ways in which this substance had been turned to more or less practical account. It has been employed in photometry, in the release of automatic shutters in cameras, in multiplex telegraphy, in phototelegraphy (the transmission of photographic images across the wire), in the photographophone (in which cinematographic images and sounds are synchronised), in television, and in the automatic regulation of lights, signals, and buoys. The optophone, in which Dr. d'Albe is apparently most interested, is an instrument which he devised first in 1912 to enable sightless persons to locate bright lights or brightly luminous patches by means of the ear and to discover shadows intercepting the light. This result was obtained by placing two selenium preparations into two arms of a Wheatstone bridge, sending a galvanometer current through the telephone and interrupting it by a clockwork motor. The lecturer explained that the work had been delayed since the war began because of the impossibility of obtaining Nernst filaments, which were essential because they gave an intense line of light; but he added that he had now found that the half-watt lamp was available as a substitute. A small, revolving, perforated disc is illuminated by the lamp, and the image of a line of luminous dots, furnished by this revolving disc, projected upon the type to be read; the light thus reflected from the type is passed to a set of selenium bridges connected by a telephone relay, and sounds corresponding to the various letters of the type are carried into the receiver. The current used is about 1 ma., but of 60 or 70 volts. Each letter of the printed matter, as it passes over the small aperture in the slab, gives, he says, a different sound effect from every other; whatever the difference in shape between any two letters, it expresses itself in a difference of tone which, with practice, the blind person would recognise. This sound alphabet, of course, has to be learned, but with practice the line of type can be moved across the aperture at the rate of several words a minute, and the sense becomes intelligible to the hearer. The maximum sound is heard in the telephone when the paper exposed is white and the minimum when it is black; therefore, what the sightless person has to learn are the variations between these two extremes. For demonstration purposes Dr. d'Albe used large printed letters, but he said that by a focussing arrangement the instrument could be adapted so as to make it possible to read type of ordinary size.

THE Hunterian lecture on Paget's Disease of the Nipple will be delivered in the theatre of the Royal College of Surgeons of England by Professor W. Sampson Handley to-day, Friday, Feb. 16th, at 5 P.M.

THE Milroy lectures of the Royal College of Physicians of London are to be delivered on Feb. 22nd, 27th, and March 1st by Dr. W. J. Howarth, his subject being "Meat Inspection, with Special Reference to the Development of Recent Years." On March 13th, 15th, and 20th Dr. G. A. Sutherland will give the Lumleian lectures of the College on "Modern Aspects of Heart Disease," and the Goulstonian lectures, with "Paratyphoid Infections" as their theme, will be delivered by Dr. C. H. Miller on March 22nd, 27th, and 29th. The time in each case is 5 P.M.

THE UNRESTRICTED DIET OF A SEDENTARY WORKER.

BY A. D. WALLER, M.D. ABERD., F.R.S.

ABOUT three months ago, at the instigation of my friend Sir W. Osler, I took a summary measurement of my daily food during three days of my ordinary unrestricted diet. Sir William had banteringly reproached me with eating too much during war-time, saying that I must be a 5000 Calories man.

The figures for my three days' trial came out as follows. The decimals attached to these figures may seem absurd in connexion with such rough weighings; their appearance is due to the fact that the calculations were made on a Comptometer by my assistant, Mr. Shapiro. They serve the purpose of enabling the arithmetic to be checked by seeing whether horizontal and vertical lines give the identical final results in Calories. The first three columns give the percentages of Protein, Fat, and Carbohydrate assumed for calculation of the actual quantities of P.F.C. in the materials swallowed.

OCT. 3RD, 1916.

1. *Early Tea.*

% assumed. P.	F.	C.		Grm.	P.	F.	C.	Cals.	
8	1	50	Bread	20	1·6	0·2	10·0	49·42	
1	80	—	Butter	5	0·05	4·0	—	37·405	
3·5	4	5	Milk	20	0·7	0·8	1·0	14·41	
—	—	100	Sugar	10	—	—	10·0	41·0	
					2·35	5·0	21·0	142·235	

2. *Breakfast.*

8	1	50	Bread	75	6·0	0·75	37·5	185·325	
1	80	—	Butter	30	0·3	24·0	—	224·43	
3·5	4	5	Milk	300	10·5	12·0	15·0	216·15	
10	50	—	Bacon	20	2·0	10·0	—	101·20	
12	12	—	Egg	50	6·0	6·0	—	80·40	
—	—	100	Sugar	25	—	—	25·0	102·50	
0·5	0·1	50	Marmalade	50	0·25	0·05	25·0	103·99	
					25·05	52·8	102·5	1013·995	

3. *Lunch.*

8	1	50	Bread	60	4·8	0·6	30·0	148·26	
1	80	—	Butter	15	0·15	12·0	—	112·215	
15	5	—	Meat	25	3·75	1·25	—	27·0	
25	25	2·5	Cheese	15	3·75	3·75	0·375	51·7875	
—	—	100	Sugar	10	—	—	10·0	41·0	
5% Alc.			Wine	(150)	—	—	—		(52·5 cals.)
					12·45	17·6	40·375	380·262	

4. *Afternoon Tea.*—Nil.

5. *Dinner.*

2	2	6	Soup	150	3·0	3·0	9·0	77·1	
10	2	—	Fish	40	4·0	0·8	—	23·84	
15	5	—	Meat	60	9·0	3·0	—	64·8	
8	1	50	Bread	30	2·4	0·3	15·0	74·13	
2	2	40	Pudding ...	50	1·0	1·0	20·0	95·4	
2	0·1	20	Potatoes ...	50	1·0	0·05	10·0	45·565	
1	80	—	Butter	5	0·05	4·0	—	37·405	
25	25	2·5	Cheese	10	2·5	2·5	0·25	34·525	
10	1·0	85	Biscuits.....	25	2·5	0·25	21·25	99·7	
5% Alc.			Wine	(300)	—	—	—		(105 cals.)
—	—	100	Sugar	15	—	—	15·0	61·5	
					25·45	14·9	90·5	613·965	

6. *Supper.*

50% Alc.			Whisky ...	(30)	—	—	—		(105 cals.)
10	1	85	Biscuits.....	25	2·5	0·25	21·25	99·7	
					2·5	0·25	21·25	99·7	
			Total		67·8	90·55	280·625	2270·657 + (262·5)	

Total calories = 2533·157

OCT. 4TH, 1916.

1. *Early Tea.*

% assumed. P.	F.	C.		Grm.	P.	F.	C.	Cals.	
8	1	50	Bread	20	1·6	0·2	10·0	49·42	
1	80	—	Butter	5	0·05	4·0	—	37·405	
3·5	4	5	Milk	20	0·7	0·8	1·0	14·41	
—	—	100	Sugar	10	—	—	10·0	41·0	
					2·55	5·0	21·0	142·235	

2. *Breakfast.*

15	8	60	Porridge ... (20 dry)	100	3·0	1·6	12·0	76·38	
8	1	50	Bread	60	4·8	0·6	30·0	148·26	
1	80	—	Butter	30	0·3	24·0	—	224·43	
3·5	4	5	Milk	400	14·0	16·0	20·0	288·20	
10	50	—	Bacon	20	2·0	10·0	—	101·20	
12	12	—	Egg	50	6·0	6·0	—	80·40	
0·5	0·1	50	Marmalade	50	0·25	0·05	25·0	103·99	
—	—	100	Sugar	25	—	—	25·0	102·50	
					30·35	58·25	112·0	1125·36	

3. *Lunch.*

8	1	50	Bread	45	3·6	0·45	22·5	111·195	
1	80	—	Butter	10	0·1	8·0	—	74·81	
10	2	—	Fish	60	6·0	1·2	—	35·76	
2	2	40	Pudding ...	60	1·2	1·2	24·0	114·48	
5% Alc.			Wine	(150)	—	—	—		(52·5 cals.)
					10·9	10·85	46·5	336·245	

4. *Afternoon Tea.*

8	1	50	Bread	40	3·2	0·4	20·0	98·84	
1	80	—	Butter	10	0·1	8·0	—	74·81	
—	—	100	Sugar	5	—	—	5·0	20·50	
3·5	4	5	Milk	10	0·35	0·4	0·5	7·205	
					3·65	8·8	25·5	201·355	

5. *Dinner.*

15	5	—	Meat	40	6·0	2·0	—	43·2	
8	1	50	Bread	45	3·6	0·45	22·5	111·195	
2	2	40	Pudding ...	80	1·6	1·6	32	152·640	
2	0·1	20	Potatoes ...	80	1·6	0·08	16	72·904	
1	80	—	Butter	5	0·05	4·0	—	37·405	
25	25	2·5	Cheese	10	2·5	2·5	0·25	34·525	
10	1	85	Biscuits...	12·5	1·25	0·125	10·625	49·850	
—	—	100	Sugar	5	—	—	5·0	20·500	
5% Alc.			Wine	(100)	—	—	—		(35 cals.)
					16·6	10·755	86·375	522·219	

6. *Supper.*

8	1	50	Bread	15	1·2	0·15	7·5	37·065	
25	25	2·5	Cheese ...	20	5·0	5·0	0·5	69·050	
50% Alc.			Whisky ...	(30)	—	—	—		(105 cals.)
					6·2	5·15	8·0	106·115	
			Total		70·05	98·805	299·375	2433·529 + (192·5)	

Total calories = 2626·029.

OCT. 5TH, 1916.

1. *Early Tea.*

% assumed. P.	F.	C.		Grm.	P.	F.	C.	Cals.	
8	1	50	Bread	30	2·4	0·3	15·0	74·13	
1	80	—	Butter	5	0·05	4·0	—	37·405	
3·5	4	5	Milk	30	1·05	1·2	1·5	21·615	
—	—	100	Sugar	5	—	—	5·0	20·5	
					3·5	5·5	21·5	153·65	

2. *Breakfast.*

15	8	60	Porridge ... (20 dry)	100	3·0	1·6	12·0	76·38	
8	1	50	Bread	60	4·8	0·6	30·0	148·26	
1	80	—	Butter	15	0·15	12·0	—	112·215	
3·5	4	5	Milk	400	14·0	16·0	20·0	288·2	
10	2	—	Fish	65	6·5	1·3	—	38·74	
—	—	100	Sugar	10	—	—	10·0	41·0	
0·5	0·1	50	Marmalade	50	0·25	0·05	25·0	103·99	
					28·7	31·55	97·0	808·785	

3. *Lunch.*

8	1	50	Bread	40	3·2	0·4	20·0	98·84	
15	5	—	Meat	30	4·5	1·5	—	32·4	
2	0·1	20	Potatoes ...	30	0·6	0·03	6·0	27·339	
1	80	—	Butter	5	0·05	4·0	—	37·405	
5% Alc.			Wine	(150)	—	—	—		(52·5 cals.)
					8·35	5·93	26·0	196·984	

4. *Afternoon Tea.*

3·5	4	5	Milk	15	0·525	0·6	0·75	10·8075	
—	—	100	Sugar	5	—	—	5·0	20·5	
					0·525	0·6	5·75	31·3075	

5. *Dinner.*

2	2	6	Soup	200	4·0	4·0	12·0	102·8	
15	5	—	Meat	85	12·75	4·25	—	91·8	
8	1	50	Bread	60	4·8	0·6	30·0	148·26	
2	0·1	20	Potatoes ...	60	1·2	0·06	12·0	54·678	
2	2	40	Pudding ...	80	1·6	1·6	32·0	152·64	
25	25	2·5	Cheese	15	3·75	3·75	0·375	51·7875	
1	80	—	Butter	10	0·1	8·0	—	74·81	
0·5	0·1	50	Jam	20	0·1	0·02	10·0	41·596	
5% Alc.			Wine	(200)	—	—	—		(70 cals.)
					28·3	22·28	96·375	718·3715	

6. *Supper.*

50% Alc.			Whisky ...	(30)	—	—	—		(105 cals.)
10	1	85	Biscuits ...	30	3·0	0·3	25·5	119·64	
			Total		72·375	66·16	272·125	2027·738 + (227·5)	

Total calories = 2255·238.

Summary.

	P.	F.	C.	Calories.	Cals. (Alc.)
Oct. 3rd	67·8	90·55	280·625	2270·657	262·5
,, 4th	70·05	98·805	299·375	2433·529	192·5
,, 5th	72·375	66·16	272·125	2027·738	227·5
Total for 3 days ...	210·225	255·515	852·125	6731·924	682·5
Average for 1 day...	70·075	85·1717	284·0417	2243·975	227·5

2471·475

There are several points of interest in this series of summary observations. My average Calorie-consumption for the three days was 2471, inclusive of 227 Calories of claret and whisky, of which the calorific value is not undisputed.

Of the total 2471, breadstuffs constituted 840 Calories, which is equivalent to 334 grammes of breadstuffs—i.e., 5 lb. 3 oz. per week.

Of the 334 grammes of breadstuffs, 200 grammes were loaf bread and 134 grammes were puddings, &c.—i.e., 3 lb. 2 oz. of bread proper (loaf bread) and 2 lb. 1 oz. of other farinaceous foods.

100 parts of my bread materials were thus made up of 60 parts of loaf bread and 40 parts of other farinaceous materials.

I do not give my own case as representative, since I am 60 years of age, weigh 190 lb., and belong to the class of sedentary workers whose calorie requirements are considerably lower than those of the manual worker. I must, however, confess myself surprised that my Calories should be as low as 2244 (without alcohol). In my "Text-book of Physiology" I have given 3000 as the average Calorie requirements per working man per day for food as eaten, and that this should have as its foundation 1 lb. of bread per day (= between 1100 and 1200 Calories).

In the report by Dr. Leonard Hill to the Health of Munition Workers Committee the standard adopted is "about 3500 Cals. of food as purchased, and about 3000 Cals. as eaten." The average of five specimen diets at the end of the report comes out as 3111 Cals. as eaten. The proportion of bread to total in these diets is not given.

The ordinary prison diet—Diet B—adopted in 1899 on the advice of a Departmental Committee on Prison Dietaries, and now in operation, contains 3040 Calories, of which the bread, inclusive of flour and oatmeal, amounts to 2378 Cals., of which 1715 Cals. are afforded by 22 oz. per day of actual bread. On this diet, by courtesy of Sir Herbert Smalley, M.D., and of the authorities of H.M. Prison, Pentonville, I find as the result of the taking of the monthly weights of 107 cases that 82 per cent. of the prisoners gained weight, while 18 per cent. lost weight. This contrasts very favourably with the weight statistics previous to 1898 on the ordinary diet, which was then equivalent to only 2035, rising to 2579 Cals., under which 67 per cent. of prisoners suffered loss of weight.

THE CONTROL OF VENEREAL DISEASES.

Syphilis in Paris.

M. Gaucher, professor of medicine at the Hôpital Saint-Louis, in association with Dr. Bizard, gives some account of the prevalence of syphilis in Paris at the end of the second year of war. He begins with an instructive résumé which we may well reproduce:—

Before the war there were treated in the clinic 300 cases of recent syphilis out of 3000 cases of all kinds, a proportion of 1:10. In the first months of the war the figures were 800 out of 5000, or 1:6. In the following eight months, 600 out of 2300, or 1:4.

He deduces from these figures that the incidence of syphilis in general has increased in Paris by nearly two-thirds. Among civilians he has found an unaccustomed proportion of the very young and of elderly subjects. Out of 219 civilians, 37 were under 20 and 16 were over 50 years of age; and he reproaches these men with taking advantage of the absence of the men-at-arms to misbehave themselves. Among his military patients two-thirds were between 25 and 35 years, and out of 120 42 were married. This fact had produced a disastrous incidence of syphilis among married women, of whom, during a period of eight months, he had seen 120 (out of a total of 222 women) with recent syphilis. Professor Gaucher goes on to comment on the extraordinary frequency of gonorrhœa in addition to syphilis and to attribute both to the deficient enlightenment of both the public and the medical profession. Among the latter errors of diagnosis were almost the rule, and clinical instruction in venereal disease was therefore a first necessity. His colleague, Dr. Bizard, had recently addressed 22 conferences with 8000 men attending, as well as five meetings of officers' training corps. Professor Gaucher sorrowfully records his experience that it is usual in France not to anticipate evils by prevention, but to await their occurrence before dealing with them, and he welcomes the recent appointment by the Minister of the Interior of a new commission to study the prevention of venereal diseases. His paper appears in *Paris Médical*.

Two Years' Experience of Arsenobenzol in France.

In August of last year the Under Secretary of State for Military Hygiene addressed a questionnaire to the various military commands as to intravenous injections of arsenical preparations during the preceding period of two years. The replies have been summarised by M. Paul Ravaut, médecin-major, in a recent number of the *Archives de Médecine et de Pharmacie Militaire* and afford statistical information of considerable value. The number of medical officers giving injections was 185 and the total number of injections given 94,762, of which all but 1537 were for syphilis. The preparations used were:—

	Times.
Neosalvarsan	35,826
Novarsenobenzol	37,352
Salvarsan and arsenobenzol	9,215
Galyl	8,846
Luargol	3,523

The dose given was usually 0·6 to 0·75 gm., exceptionally 0·9, and even up to 1·5 gm. All began with a small dose. Salvarsan and arsenobenzol were always given diluted to 150 or 200 c.c. with saline; neosalvarsan and novarsenobenzol in a large proportion of cases in concentrated solution, often as little as 1 or 2 c.c. Galyl and luargol injections ranged between 5 and 20 c.c. in bulk. No fatal case was reported among the 95,000 injections, but a military doctor reported having seen a Belgian soldier in a neighbouring service who died of arsenical intoxication after a dose of 0·3 gm. neosalvarsan, his death being attributed to arsenical idiosyncrasy. Of the more serious accidents observed, one man had transient coma, another delirium and epileptiform crisis (both after neosalvarsan), four had transient "nitritoid crises" (after galyl), two had meningeal irritation and two facial paralysis (after neosalvarsan), two had epileptic crises, (neosalvarsan 1, galyl 1). Albuminuria, always transitory, occurred in 11 cases (neosalvarsan 4, novarsenobenzol 2, salvarsan 1, galyl 3, luargol 1), a passing icterus in 20 cases (in about the same proportion). One case of acute dermatitis followed a luargol injection, two cases were intolerant of neosalvarsan, which had in consequence to be discontinued. Local accidents were rare, abscess only occurred 4 times and was then attributed to faulty technique. The general criticism of the various preparations may be given in full:

Neosalvarsan: Very good.

Novarsenobenzol: Preferred. All find it at least equal to neosalvarsan, sometimes better. The incidents attendant on injection appear less frequent.

Salvarsan and arsenobenzol: Are considered very active. Have only been employed in default of the preceding, of which the injection is much simpler and more rapid. Only one doctor remained faithful to its use throughout.

Galyl: Very active, according to some. Complaint is made of variations in manufacture, differences of solubility, and frequency of small accidents following injection. Owing to the last fact, a dose of 0·2 gm. has rarely been exceeded, which has diminished the efficacy of the treatment.

Luargol: Is arsenobenzol reinforced with silver and antimony. Some doctors find it extremely active. Complaint has been made that it has produced induration of the veins of the arm in consequence of too high a content of soda in the solvent.

An addendum records a fatal case, reported after the date of the inquiry, in a gunner 19 years of age, 48 hours after an injection of 0·9 gm. of novarsenobenzol. Coma was the first symptom, followed by convulsions and cyanosis. The necropsy revealed multiple congestion of all the organs, in particular of the brain. The reporting medical officer ascribed the accident to an ampoule of which the contents had deteriorated.

The report is a testimony to the remarkable safety of arsenical injections in skilled hands.

His Excellency the Chancellor of the Calcutta University has nominated Lieutenant-Colonel R. P. Wilson, F.R.C.S., D.P.H., I.M.S., to be an Ordinary Fellow of the University.

NOTES FROM INDIA.

(FROM OUR OWN CORRESPONDENTS.)

Quinine Production and Investigation of Indian Indigenous Drugs.

Lieutenant-Colonel Sir Leonard Rogers, I.M.S., was recently examined as a witness by the Industries Commission in Calcutta in regard to the production and manufacture of quinine. The cinchona plantations, he said, had been considerably extended in the Darjeeling hills, and the output of quinine increased. The last report showed that the plantations had been a sufficient financial success to render further extension advisable. The supply of quinine to treat the millions suffering from malaria in India was entirely inadequate, and the economic loss occasioned thereby in Bengal and other malarious parts of India was incalculable. Sir Leonard Rogers added that at present there was no professorship of pharmacology in India, and no considerable amount of original investigation of drugs had yet been carried out in the country. One such post had, however, been sanctioned for the School of Tropical Medicine after the war. Many indigenous drugs still required scientific investigation, and half a lakh of rupees had recently been given by the Maharaja of Darbhanga for this special work.

Prison Improvement in Burma.

Major H. H. G. Knapp, I.M.S., Inspector-General of Prisons, Burma, has been placed on special duty to visit the more important jails in the Madras, Bengal, and Bombay presidencies and in the provinces of Bihar and Orissa, the United Provinces, and the Punjab, to study the most recent methods adopted for the accommodation and reformation of prisoners and for the training of them for their return to ordinary life. The Governments concerned have offered him every facility.

Scottish Women's Hospitals.

Lord Carmichael presided recently at a meeting in aid of the Scottish Women's Hospitals for foreign service. Contributions of Rs. 80,000 were announced and it is hoped that two lakhs of rupees will be forthcoming.

The Catherine Booth Hospital at Nagercoil.

Inaugurated in 1900, this hospital has grown from a modest dispensary into a well-equipped institution with general and private wards covering seven acres of ground. Connected with the hospital are four branch institutions. The Maharaja of Travancore has built a new men's ward at a cost of Rs. 3500, while his Government has made frequent grants-in-aid.

Death of Dr. B. K. Coomar.

Dr. Bepin Krishna Coomar, the news of whose death from diabetic coma at the age of 67 has just reached this country, was one of the best known Bengali medical men. Entering Calcutta Medical College in 1868, he qualified in 1875 and became house surgeon to the Medical College Hospital, starting in private practice two years later. Dr. Coomar was an honorary magistrate, for several years a Commissioner of the Bali municipality, and an active member of the Indian Association for the Cultivation of Science.

Jan. 20th.

THE SERVICES.

ROYAL NAVAL MEDICAL SERVICE.

Staff-Surgeons to be Fleet-Surgeons: E. Cox, J. Macdonald, A. La T. Darley, A. J. Wernet, C. E. C. Stanford, A. R. Thomas, T. F. O'Keefe, E. F. Ellis, D. V. Lowndes, P. F. Alderson, J. Thornhill. To be temporary Surgeons: B. L. Lloyd, N. H. Smith.

ARMY MEDICAL SERVICE.

Col. C. Birt is retained on the Active List, under the provisions of Articles 120 and 522, Royal Warrant for Pay and Promotion, and to be supernumerary.

Major Sir Edward S. Worthington, C.M.G., M.V.O., to be a Deputy Assistant Director-General, vice Lieut.-Col. G. St. C. Thom, C.M.G., who has vacated the appointment.

ROYAL ARMY MEDICAL CORPS.

To be acting Lieutenant-Colonels whilst in command of a Field Ambulance: Major J. W. H. Houghton, Major B. S. Bartlett, D.S.O., Brevet Lieut.-Col. Henry J. Crossley.

Temp. Major T. R. Elliott to be temporary Lieutenant-Colonel.

Major (temp. Lieut.-Col.) G. E. Ferguson relinquishes his temporary rank on reposting.

Major A. H. Burgess, R.A.M.C., T.F., to be temporary Lieutenant-Colonel.

To be temporary Lieutenant-Colonel whilst employed at the Grove Military Hospital, Tooting: E. W. Goodall.

Major R. G. Anderson is restored to the establishment.

Major (acting Lieut.-Col.) A. B. Hinde relinquishes his acting rank on reposting.

Temp. Capt. J. A. Torrens to be temporary Major.

To be temporary Captains: J. Watson, Surg.-Capt. H. J. Shone (Jersey Militia), E. E. Hobson (late temporary Captain, R.A.M.C.), E. C. Lindsay (late temporary Captain, R.A.M.C.).

To be temporary Honorary Captain: Temp. Hon. Lieut. H. A. F. Wilson.

Temporary Lieutenants to be temporary Captains: L. S. H. Glanville, W. Roche, J. S. Doyle, J. F. Wood.

Temp. Lieut. Charles C. Gibson to be temporary Captain.

To be temporary Lieutenants: J. B. Lester, C. W. Windsor, S. Marle, A. H. Bostock, A. McK. Niven, W. A. Smith, W. Hibbert, M. Crowley, C. B. Simpson, D. L. Morrison, T. Archdeacon, P. W. Ashmore, J. Reid, F. R. Tickle, A. Kirkhope, V. G. Ward, J. H. Pratt, G. P. Barff, H. S. McLellan, A. L. Gardner, A. K. S. Wyborn, W. Hartland, T. W. Arnison, J. H. F. Wilgress, W. E. Tanner, J. Howells, M. Hooper, H. L. W. Wemyss, W. H. Cam, F. Osborne, A. W. MacK. Sutherland, H. H. V. Welch, K. L. Bates, E. K. Campbell, J. M. N. S. Bickerton, E. Rommel.

The following relinquish their commissions: Temp. Hon. Capt. J. D. Lyle (having resigned his appointment at the British Red Cross Hospital, Netley), Temp. Hon. Capt. W. D. Coplestone (having resigned his appointment with the St. John Ambulance Brigade Hospital), Temp. Capt. B. C. Ashton (on appointment to Indian Medical Service), Temp. Lieut. W. M. Crombie (on appointment to Indian Medical Service), Temp. Lieut. T. Anwyl-Davies (on account of ill-health).

SPECIAL RESERVE OF OFFICERS.

To be Lieutenants: J. A. Panton (from Manchester University Contingent O.T.C.), N. C. L. B. Tweedie (from Belfast University Contingent O.T.C.), P. D. McLaren (from Edinburgh University Contingent O.T.C.), J. R. S. Mackay, D. J. Batterham and T. L. Heath (from University of London Contingent O.T.C.).

Lieutenants to be Captains: G. I. Evans, D. M. M. Fraser, R. S. Woods, G. S. Davidson, W. C. C. Easton, J. A. Mackenzie, W. N. Greer, D. G. Duff, A. McL. Ferrie, I. MacKenzie, E. A. Mills, C. Milne, J. Milne, C. P. Penberthy, M. Stewart, E. W. Fish, C. R. Knowles, R. S. Aspinal, D. S. Scott, N. H. Harrison.

TERRITORIAL FORCE.

Capt. (temp. Major) D. Dickie, D.S.O., relinquishes his temporary rank on alteration in posting.

Capt. A. S. Hebblethwaite, from West Riding Casualty Clearing Station, to be Captain.

Capts. H. N. Burroughes, F. Coleman, and S. F. Linton to be acting Lieutenant-Colonels whilst commanding a Field Ambulance.

Capt. W. R. Rothwell, from 3rd East Lancashire Field Ambulance, to be Captain.

Capt. E. N. Butler, from Territorial Force Reserve, to be Captain.

Capt. (temp. Lieut.-Col.) H. K. Dawson relinquishes his temporary rank on ceasing to command a Field Ambulance.

Lieut. A. G. Reid to be Captain.

Capt. G. C. Gray relinquishes his commission on account of ill-health contracted on active service and is granted the honorary rank of Captain.

Major (temp. Lieut.-Col.) P. R. Ash relinquishes his temporary rank on ceasing to command a Field Ambulance.

URBAN VITAL STATISTICS.

(Week ended Feb. 10th, 1917.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 18,000,000 persons, the annual rate of mortality was equal to 21·3, against 17·0 and 18·7 per 1000 in the two preceding weeks. In London, with a population of more than 4,000,000 persons, the death-rate was 22·2, or 2·4 per 1000 higher than that recorded in the previous week; in the remaining towns the rate ranged from 11·4 in Hornsey, 12·8 in Enfield, and 12·9 in Wimbledon and in Wakefield, to 33·5 in Brighton, 33·7 in Bath, and 34·0 in Wigan. The principal epidemic diseases caused 276 deaths, which corresponded to an annual rate of 0·8 per 1000, and included 89 from measles, 66 from diphtheria, 56 from infantile diarrhœa, 49 from whooping-cough, 9 from scarlet fever, and 7 from enteric fever. The deaths from measles, whooping-cough, and diphtheria were in excess of the average in the three preceding weeks; measles caused a death-rate of 1·5 in East Ham, 1·8 in Wimbledon, 1·9 in Barrow, and 4·2 in Wigan. The 801 cases of scarlet fever and the 1427 cases of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital were respectively 17 and 3 less than the numbers at the end of the previous week. Of the 7058 deaths from all causes in the 96 towns, 274 resulted from violence. The causes of 90 of the total deaths were uncertified, of which 24 were registered in Birmingham, 13 in Liverpool, and 6 each in Preston and South Shields but only 3 in London.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2,500,000 persons, the annual death rate was equal to 17·9, against 16·9 and 17·7 per 1000 in the two preceding weeks. The 379 deaths registered in Glasgow corresponded to an annual rate of 17·7, against 22·2 per 1000 in London, and included 12 from whooping-cough, 10 from measles 2 from diphtheria, and 1 each from scarlet fever and infantile diarrhœa. The 130 deaths in Edinburgh were equal to a rate of 20·4 per 1000, and included 5 from whooping-cough and 1 each from measles and infantile diarrhœa.

Irish Towns.—The 215 deaths registered in Dublin were equal to an annual rate of 28·1 per 1000, and included 6 from measles, and 1 each from diphtheria and infantile diarrhœa. In Belfast 240 deaths were recorded, equal to a rate of 31·8 per 1000, and included 2 from infantile diarrhœa and 1 each from measles, whooping-cough, and diphtheria.

AT the last meeting of the Chipping Sodbury board of guardians the salary of the district medical officer was increased by £20 in consideration of the high price of drugs at present prevailing.

Correspondence.

"Audi alteram partem."

THE DIFFERENTIATION OF HEART MURMURS IN SOLDIERS.

To the Editor of THE LANCET.

SIR,—Perhaps I may be permitted to make a few comments upon the letters that have appeared upon the subject of my letter in your issue of Nov. 4th, 1916. In the first place, may I remind your correspondents that the object of my communication was to call attention to a simple method by the practice of which I ventured to hope a common mistake might be avoided—I mean the mistake of confusing functional derangement of the heart with organic valvular disease—by means of the pressure test described.

I was pleased to have Dr. Leslie Thorne Thorne's corroboration and experience, and I may truthfully say that the more I have seen of these cases in returned soldiers the more convinced have I become of the value of the test. I must, however, insist upon the necessity for firm pressure, by which the ribs are pressed in by the fingers holding the bell-piece of the stethoscope, and their vibrations thus controlled as far as possible; for, unless this be done, some part of the functional bruit may persist and the observer be led into error.

In reply to Dr. A. Kinsey-Morgan, who questions the frequency of murmur in the cases under discussion, I must repeat that in my experience, derived from the control of medical wards containing upwards of 100 beds, they have been very frequent, though mutable and inconstant; in some, present alone in the recumbent position and altogether inaudible when standing, whilst in others the reverse order holds. In some the murmur is only audible when the patient is lying on his left side; in others, again, it ceases when he draws a long breath, and returns at the end of expiration. It is strange that Dr. A. Kinsey-Morgan should suggest that the bruit to which I referred was the so-called cardio-pulmonary murmur, a well-known type of functional murmur, for, as it happens, the cardio-respiratory bruit, as I have been accustomed to interpret the phenomenon, is, so far as I have been able to discover, the only functional murmur that has consistently withstood the effects of pressure.

I am indebted to Dr. Theodore Fisher for his remarks upon the causation of functional bruits, which greatly interested me; but I trust he will forgive me if I confine myself at present to their behaviour in response to the pressure test and its diagnostic value. I would say, however, that I do not think that the murmurs we render inaudible by pressure are caused by valvular leakage; in other words, I have not been able to regard them as endocardial. That they are the result of some functional disturbance in the cardiac muscle contractions producing vibrations communicated to the chest-wall is more than likely, and for this bruit I ventured to suggest in a paper published in THE LANCET in 1895 the name of neuro-typtic, compounded of neuron and tupto. But it is obvious that this explanation will not cover the entire ground, though I would still regard them as exo-cardial—as opposed to valvular— murmurs. I may mention that the murmurs of dilatation are not rendered inaudible by pressure, nor are the bruits associated with and ascribed to anæmia (pulmonary systolic). But, on the other hand, systolic murmurs generated at the aortic orifice and conducted to the apex, and often mistaken for evidence of mitral regurgitation, may be arrested by pressure.

I am, Sir, yours faithfully,

Newcastle-on-Tyne, Feb. 3rd, 1917. DAVID DRUMMOND.

THE PHENOMENA OF ANAPHYLAXIS.

To the Editor of THE LANCET.

SIR,—I fear that I have already trespassed too much on your valuable space, but there is one comment that I should like to make on Captain S. Wyard's letter in your issue of to-day's date. If I understand him correctly, he suggests that the first case I reported, in which the patient received injections of antistreptococcal serum and a streptococcal vaccine, is not a true case of serum anaphylaxis, but is the result of injecting anaphylatoxin produced by the action of the antistreptococcal serum on the streptococci. It seems to me impossible to accept such an explanation on the following grounds. In the classical experiments of Friedemann, Friedberger, and others on the *in vitro* production of anaphylatoxin, the methods adopted involved the action of considerable amounts of active complement on sensitised protein or bacteria. The various brands of antisera on the market, which have always been stored for some time before use, are in most cases almost destitute of active complement, or contain the merest trace. Again, the production in the test-tube of anaphylatoxin involves either prolonged action on ice or at room temperature or a moderate incubation time at 37° C. As I stated in my letter, the vaccine and antiserum were in this case mixed in the syringe immediately before use and therefore were only in momentary contact at room temperature before inoculation. It is, of course, theoretically possible that the antiserum might sensitise the bacteria so that they were subsequently acted upon by the patient's own complement. This explanation is, I think, completely ruled out by the results of the extensive use of sensitised vaccines, which are, by common consent, less toxic than the non-sensitised variety. There seems to be no reasonable doubt that the anaphylactic symptoms must be attributed in this as in the other cases to the action of the serum.

I was greatly interested by Captain Wyard's statement that the cases in which he had himself observed anaphylactic symptoms were those which had received a series of doses at short intervals. Since my last letter appeared Professor Leyton has very kindly called my attention to a series of observations published by him in the *Journal of Hygiene* in 1908, which bear a striking resemblance to those I reported. It seems to me that it would be of great value if those who are working with antisera would publish any results of the kind which they may have obtained, since at the present time it is most desirable that the risk involved should be accurately estimated.—I am, Sir, yours faithfully,

W. W. C. TOPLEY.

Bacteriological Department, Charing Cross Hospital,
Feb. 10th, 1917.

THE "TOXIC" EFFECTS OF METHYLENE-BLUE.

To the Editor of THE LANCET.

SIR,—It is generally admitted that the administration of methylene-blue has been followed by the most satisfactory results in the treatment of malaria and many other affections. In your issue of Dec. 23rd last appeared a note by Mr. Clifford Dobell and Dr. G. C. Low on the Treatment of Lamblia Infections, in which it is stated that treatment by methylene-blue had to be discontinued owing to the "toxic" effects produced. In case any who might wish to employ this valuable remedy should be deterred from doing so by consideration of this finding, I desire to place before your readers the results of my experience in the use of methylene-blue.

Many years ago[1] in conjunction with Mr. F. W. Gee, I.M.S., I conducted a series of experiments, not only on natives of India but on British officers and others, with a view to ascertain the value of methylene-blue in the treatment and prophylaxis of malaria. Chloride of zinc is employed in the preparation of this drug, and the slightest trace of this or other impurity remaining in the finished product is apt to set up severe vesical and rectal irritation; the supply obtainable at that time in India was evidently impure, as we had many cases of retention of urine and severe tenesmus. During recent years I have, at home, employed methylene-blue in the treatment of many cases of various kinds without any complaints from the patients.

After reading Mr. Dobell's and Dr. Low's communication, with a view of testing the conclusions I placed a patient showing a heavy "lamblia" infection on 9 grains per diem of methylene-blue (3 grains with 1 grain extract. hyoscyami in the form of pill three times a day); in all 72 grains were given. The patient did not manifest the slightest discomfort, the general condition improved with increase of body weight, and regular

[1] On the Use of Methylene-blue in Malarial Fevers, Indian Medical Gazette, xxviii., 1893.

examination of the stools showed a steady decrease in the number of cysts and free living forms. At present, only a very few cysts can be detected after prolonged search. One is forced to the conclusion that either in the case reported by Mr. Dobell and Dr. Low a pure sample of methylene-blue was not obtained or that the patient was peculiarly intolerant of the remedy.

To anyone who wishes to obtain pure methylene-blue I shall be glad to furnish the name of a drug-house, in Edinburgh, where a supply may be obtained which is "above suspicion." I am, Sir, yours faithfully,

University of Edinburgh, Feb. 5th, 1917. D. G. MARSHALL.

THE ASSOCIATION OF ATROPHY OF THE TESTICLE AND INGUINAL HERNIA.

To the Editor of THE LANCET.

SIR,—Two patients arrived from France recently with inguinal hernia and atrophy of the testicle on the same side as the hernia. The wasted testes were half as small as those of the opposite ones, and neither of the patients was conscious of this condition. Both of the atrophied testes were well descended in the scrotum. The rarity of this state points rather to a coincidental than a developmental condition. It has an important bearing to the surgeon, who may receive the credit of producing the abnormality, as after the operation the testes will still remain atrophied. I have pointed out the condition to each patient and have asked them to sign a statement that the testicle on the side of the hernia is much smaller than the other testicle. This will not prevent the unscrupulous or the ignorant passing an adverse criticism to suit their own puposes, but it will safeguard the surgeon in case of litigation.—I am, Sir, yours faithfully,

JOSEPH E. G. CALVERLEY, C.M.G., B.S. Lond.

Folkestone, Feb. 8th, 1917.

PNEUMATIC TOURNIQUETS.

To the Editor of THE LANCET.

SIR,—The use of the sphygmomanometer armlet as an agent for obstructing the venous return when either venesection or intravenous medication is to be practised has probably occurred to many physicians. Dr. Hildred Carlill's letter in your issue of Feb. 10th confirms generally what has previously been written on the subject. Dr. J. Alfred Codd drew attention to the method in the *British Medical Journal* of Dec. 11th, 1915, and in the same journal on Jan. 29th, 1916, I ventured to add one or two practical points based on my own experience. One of these I should like to repeat, as I have seen the neglect of it lead to trouble. It is that the armlet prior to inflation should not grip the arm too closely—that, in other words, the constricting force should be provided solely by the air driven into the air-bag and not by the armlet band. Unless this is remembered the deflation of the air-bag at the moment the operation is completed will not entirely remove the obstructing pressure from the vein, and one of the consequences of this may be an unnecessary hæmatoma at the site of puncture. In short, the firm application of the armlet practised in taking the "blood pressure" ought to be avoided when the armlet is used to obstruct the venous return as a necessary preliminary either to venesection or to intravenous medication.

I am, Sir, yours faithfully,

Harley-street, W., Feb. 12th, 1917. C. O. HAWTHORNE.

THE FIRST SCHOOL FOR MOTHERS.

To the Editor of THE LANCET.

SIR,—The article on child welfare work in THE LANCET of Jan. 27th mentions the year 1899 and refers to the foundation of the first school for mothers in the borough of St. Pancras "eight years later." An opportunity was given me to come up from Winchester, where I was then medical officer of health, to attend the opening meeting, which, if my memory serves, took place in the late spring of 1907.

From the annual report for 1906 on the health of the City of Winchester it appears that in November of that year—

> .....arrangements were made for the notification of births by midwives within 14 days, the fee offered being 2d. for each birth, or 3d. if the notification also stated the weight of the child at birth. Midwives were supplied with copies of two pamphlets, one entitled "Advice to Mothers," the other "How to bring up a Baby on the Bottle." Each pamphlet pointed out the advantages of periodical weighing and contained an invitation to mothers to bring their babies once a fortnight to be weighed on the corporation weighing machine. Tea is provided for the mothers gratis.

The mothers attending were advised by the medical officer of health, and the first client was secured some time in the last half of the month of November, 1906. The annual report dated April 16th, 1907, states that eight mothers were attending regularly, presumably on some earlier date when the manuscript of this section of the report was sent to the printer.

If you can find space for the publication of this letter it will serve to give to the corporation of the City of Winchester the credit which is their due of founding the first school for mothers in this country.

I am, Sir, yours faithfully,

J. E. SANDILANDS,
Medical Officer of Health, Royal Borough of Kensington.

Feb. 5th, 1917.

STOCK MIXTURES AND PANEL PRACTICE.

To the Editor of THE LANCET.

SIR,—The annotation on Stock Mixtures in your issue of Feb. 10th might have laid more emphasis on two points in the circular.

1. The avoidance of deterioration is secured by the selection of the drugs and not by the addition of any form of preservative other than emulsion of chloroform, which appears to be employed more as a flavouring agent than on account of any special property, medicinal or otherwise.

2. Although the universal adoption of this list of stock mixtures will materially lighten the labours of pharmacists engaged in panel practice, it is to be feared that, so far as the medical profession is concerned, while similarly reducing much routine, it must tend to diminish scientific progress and to limit the work of panel practitioners to the treatment of the most prominent symptom.

I am, Sir, yours faithfully,

Feb. 10th, 1917. SOLLICITUS.

Medical News.

ROYAL COLLEGES OF PHYSICIANS OF LONDON AND SURGEONS OF ENGLAND.—At a meeting of Comitia of the Royal College of Physicians on Jan. 25th and of the Council of the Royal College of Surgeons on Feb. 8th diplomas of L.R.C.P. and M.R.C.S. were respectively conferred upon 83 candidates (including five ladies) who have passed the Final Examination of the Conjoint Board in Medicine, Surgery, and Midwifery, and have complied with the by-laws of each College. The following are the names and medical schools of the successful candidates:—

Jugal Kishor Adhya, Calcutta Medical College and Middlesex Hospital; Adolfo Arias, St. Bartholomew's Hospital; Cedric Whitfield Armstrong, London Hospital; Eric Miles Atkinson, St. Bartholomew's Hospital; Henry Hamilton Bailey, Durham University and London Hospital; Kenneth Norman Grierson Bailey, St. Bartholomew's Hospital; Edwin Jennings Ball, Bristol University; Douglas John Batterham, Cambridge University and St. Bartholomew's Hospital; Leslie Graham Blackmore, Middlesex Hospital; Charles James Longworth Blair, St. Bartholomew's Hospital; Harold John Blamoled, St. Thomas's Hospital; Charles Sidney Bluemel, Colorado University and University College Hospital; Duncan Campbell Bluett, Cambridge University and St. Thomas's Hospital; William Hallock Braddock, Columbia University; Hilda Kathleen Brade, Manchester University; John Burke, Glasgow University and London Hospital; Patrick Alfred Buxton, Cambridge University and St. George's Hospital; Charles Herbert Carroll, London Hospital; Duncan Gillard Churcher, St. Thomas's Hospital; Alan Andreas Cockayne, Cambridge University and St. Thomas's Hospital; Cyril John Chesterfield Cooke, University College Hospital; Gunaratnam Franklin Cooke, Ceylon Medical College and St. Bartholomew's Mospital; Jean Cretin, St. Bartholomew's Hospital; Ahmed Tayel Dabbous, Westminster and Guy's Hospitals; Albert Victor Spurgeon Davies, St. Mary's Hospital; George Vincent Davies, St. Mary's Hospital; Mahmoud Abu Bakr Demerdash, Cairo and University College Hospital; Harold Aylmer De Morgan, Middlesex Hospital; Alan Roy Dingley, St. Bartholomew's Hospital; John Reginald Keith Fenning, London Hospital; Langdon Percival Lorimer Firman-Edwards, Cambridge University and St. Bartholomew's Hospital; Arthur Alfred Fitch, Liverpool University and St. Bartholomew's Hospital; Frederick Christopher Ashley Frith, Bristol University; William Vincent Gabe, Middlesex Hospital; Aziz Girgis, London Hospital; Lionel Bernard Goldschmidt, King's College Hospital; Harry Goudge Grant,* Dalhousie University and University College Hospital; John Richard Harris, Cambridge University and St. Thomas's Hospital; Geoffrey Arthur Harrison, Cambridge

University and King's College Hospital; Thomas Lowthian Heath, Guy's Hospital; Norman Sinclair Hewitt, Cambridge University and London Hospital; George Hoffmeister, Middlesex Hospital; Malcolm Cyril Joynt, Guy's Hospital; Edward Athol Clarence Langton, St. Bartholomew's Hospital; Felix Raoul Leblanc, Guy's Hospital; Annie Lloyd, Royal Free Hospital; Eadbert Ralph Longstaff, St. Bartholomew's Hospital; Ronald William Lush, Oxford University and Middlesex Hospital; Howard Douglas McIlroy, Cambridge University and London Hospital; Kenneth Alexander Ingleby Mackenzie, Oxford University and St. Bartholomew's Hospital; Keith Masson, Cambridge University and St. Bartholomew's Hospital; Maurice William Holt Miles, St. Thomas's Hospital; Marie Mathilde Alice Moralt, Royal Free Hospital; John Branwell Mudge, St. Bartholomew's Hospital; Elizabeth O'Flynn, Royal Free and St. George's Hospitals; Edmund Stuart Orme, Cambridge University and St. Thomas's Hospital; John Allison Panton, Manchester University; Maurice Pearson, Guy's Hospital; Cyril John Penny, Cambridge University and Middlesex Hospital; Victor Felicien Clement Joseph Philippe, Brussels University; Frank Portas, Westminster Hospital; Arthur Abercrombie Prichard, Cambridge and Glasgow Universities; Ernest Digby Roberts, Lausanne University; James Paterson Ross, St. Bartholomew's Hospital; Kenneth Mackinnon Ross, London Hospital; George Harold Rossdale, Oxford University and St. Bartholomew's Hospital; Nirendra Mohan Sen-Gupta and Mandell Shimberg, London Hospital; Raghunath Dadoba Shirwalkar, Bombay University and University College Hospital; Fiora Nihal Singh, Calcutta Medical College and Royal Free Hospital; Charles Rees Smith, Guy's Hospital; Neville Hardcastle Smith, Cambridge and Liverpool Universities; Vincent Russell Smith, St. Mary's Hospital; John Great Stevens; Guy's Hospital; David Stewart, Manchester University; Daniel Jenkin Thomas and John Herbert Thomas, University College Hospital; Wilfred Graham Verniquet, Cambridge University and St. Bartholomew's Hospital; Herman Crowther Viehoff, Liverpool University; Sydney Arthur Thomas Ware, St. Thomas's Hospital; Arthur Alward Watkinson, Charing Cross Hospital; Edward Williams, London Hospital; and Arthur Trevor Woolward, Cambridge University and London Hospital.

* Diploma of M.R.C.S. granted Dec. 14th last.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—An ordinary meeting of the Council was held on Feb. 8th, Sir W. Watson Cheyne, the President, being in the chair. It was resolved to grant diplomas of Membership to 82 successful candidates, and in conjunction with the Royal College of Physicians of London to give diplomas in Public Health to six successful candidates. The Finance Committee reported that £23,900 had been invested in the War Loan, including £2,000 of new money. It was referred to the Finance Committee to consider the desirability of obtaining a loan for the purpose of further investment in the War Loan. Captain Raymond Johnson was elected a member of the Court of Examiners. Mr. Herbert Furnivall Waterhouse was elected a member of the Board of Examiners in Dental Surgery. A letter was read from Lord Rhondda, President of the Local Government Board, stating that the suggestions made by the Council of the College on the subject of the treatment and prevention of venereal diseases will receive his careful and sympathetic consideration. A letter was received from Lady Eve thanking the President and Council for their kind expressions of sympathy in her bereavement. Sir John Bland-Sutton was appointed Bradshaw lecturer for the ensuing year.

Licences in Dental Surgery were conferred upon the following two gentlemen who have now complied with the requirements:—

Beresford Tom Richards, Birmingham University; and Reginald Joseph Ryland, Guy's Hospital.

UNIVERSITY OF LONDON.—At the First Examination for medical degrees, held recently, the following candidates were successful:—

Frances Dacre Alexander and Eleanor Mary Ashmall, London (Royal Free Hospital) School of Medicine for Women; Frederick Bach, London Hospital; Ormonde Alan Baker, University College; Gladys Lieba Buckley, Girton College; Dora Mahalah Cadman, London (Royal Free Hospital) School of Medicine for Women; Antoine Yves Cantin, London Hospital; Linda Catmur, Dorothy Spencer Chamberlain, Ivy Collier, and Annie Eveline Connan, London (Royal Free Hospital) School of Medicine for Women; Marguerite Eilaline Cooke, private study; Rustam Nusserwanji Cooper, University College; John Alexander Currie, Guy's Hospital; Percy Tyson Davidson, Middlesex Hospital; Betty Dent, London (Royal Free Hospital) School of Medicine for Women; Conor John Donelan, St. Paul's School and St. Bartholomew's Hospital; Hilda Ray Dutton, University College, Exeter; Keridwen Valentine Edwards, University College, Cardiff; Lucy Margaret Elsom, Victoria University of Manchester; Rowland Henry Evans, University College, Cardiff; Geoffrey Edward Woollcombe Felce, Guy's Hospital; Emmie Dorothy Fenwick, London (Royal Free Hospital) School of Medicine for Women; Olive Gwendolin Fisk, Girton College; William John Gale, B.Sc., Battersea Polytechnic, South-Western Polytechnic Institute, and private study; Mark Garden, London Hospital; Lena Belia Gayer and Geraldine Norah Geary, London (Royal Free Hospital) School of Medicine for Women; Brian Wilson Barnett Gordon, Epsom College and St. Mary's Hospital; Barnett Gould, B.A., London Hospital; Marjorie Pearl Christine Greene, Roedean School; Stanley Allwright Gunter, St. Bartholomew's Hospital; Frederick James Simkin Hall, University College, Reading; Gertrude Eleanor Harre, Girton College and London (Royal Free Hospital) School of Medicine for Women; Elizabeth Merriman Heath, Marjorie Browning Hubert, and Irene Esther Kenworthy, London (Royal Free Hospital) School of Medicine for Women; Oscar Bevan Lean, Bootham School; Bessie Levin, University College; Denzil Haydn Lewis, St. Mary's Hospital; Ivor Lewis, University College, Cardiff; Muriel Jessie Lough, B.Sc., Birkbeck College; Mary Catherine Lynch, London (Royal Free Hospital) School of Medicine for Women; Ivan Bailey McCann, Guy's Hospital; Dorothy McNair, London (Royal Free Hospital) School of Medicine for Women; Edward Francis Malins, King Edward's High School, Birmingham; Harold Jordan Malkin, University College; Amin Mikhail, King's College; Emily Marjorie Milnes, London (Royal Free Hospital) School of Medicine for Women; Sybil Grace Mocatta (distinction in Inorganic Chemistry and Physics), King's College and London (Royal Free Hospital) School of Medicine for Women; Leslie Stuart Morgan, St. Bartholomew's Hospital; Doris Maude Odlum, B.A., London (Royal Free Hospital) School of Medicine for Women; Winifred Catherine Piggott, Bootham School, Bedford College, and London (Royal Free Hospital) School of Medicine for Women; Mary Winifred Pitt-Lewis, Beatrice Myrtilla Powell, and Gwendolen Mary Pratt, London (Royal Free Hospital) School of Medicine for Women; Margaret Annette Quine, Victoria University of Manchester; John Gresoort Reid, Epsom College and St. Thomas's Hospital; James Stuart Ricketts, King's College; Edith Margaret Ross-Johnson, Newnham College; Effie Frederike Amelia Samter, Victoria University of Manchester; H. Virginia Saunders-Jacobs, B.Sc., Newnham College; Alfred Senn, London Hospital; Christopher James Lewen Sharp, St. Paul's School; Thomas Archibald Shaw, Guy's Hospital and Mill Hill School; Abraham Isaac Silverman, Middlesex Hospital; Leonard Smalley, St. Thomas's Hospital; George Morris Stoker, Guy's Hospital; Edward Howard Strange, University College, Cardiff; William Hedley Summerskill, Guy's Hospital; Arthur Cleve Damian Telfer, St. Bartholomew's Hospital; Wenefride Thompson, London (Royal Free Hospital) School of Medicine for Women; Ethlin Hugh Weatherall (distinction in Biology), St. Bartholomew's Hospital; Leslie Ralph Augustus Wells, Guy's Hospital; Enid Margaret Williams, Swansea Technical College and King's College; Trevor Morgan Raleigh Williams, Swansea Technical College and University College; Henry Norman Witham, St. Thomas's Hospital; and Jacob Elias Zeitlin, London Hospital.

Major R. W. Knox, D.S.O., I.M.S., has had conferred on him the Serbian decoration of the White Eagle.

CENTENARIAN.—**The death of Mrs. Hannah Lusted, of Lewes, at the age of 101, is reported.**

THE death occurred on Jan. 16th last of Mr. R. H. F. Rippon at Upper Norwood, where he had been resident for 36 years. He was 80 years of age, and for the past two years had been in receipt of a Civil List Pension of £100 per annum in recognition of his services to Natural History and Science.

ROYAL SANITARY INSTITUTE.—**A discussion will take place to-day, Saturday, Feb. 17th, at 10.30 A.M., at the Town Hall, St. Helens, on Measures to be Taken to Prevent Contamination of Food by Flies. The discussion will be opened by Dr. Joseph Cates (medical officer of health), and the chair will be taken by Professor A. Bostock Hill.**

REGIUS PROFESSORSHIP OF PHYSIC IN DUBLIN UNIVERSITY.—Our Dublin Correspondent writes: The vacancy in the Regius Professorship of Physic in the University of Dublin, caused by the death of Dr. James Little, has been filled by the appointment of Dr. John Mallet Purser, F.R.C.P.I.rel. Dr. Purser was King's Professor of the Institutes of Medicine in the School of Physic from 1874 to 1901. His return to a position of influence in the University will please many generations of old Trinity College men.

ST. MARK'S HOSPITAL, CITY-ROAD, E.C.—**The Lord Mayor of London, who presided at the eighty-first annual meeting of this hospital on Feb. 8th, in moving the adoption of the report, said that the accounts showed an adverse balance of £600, due in a great measure to the large number of war appeals and to considerable increase in the cost of everything connected with hospital administration. The need for this hospital was shown by the fact that it had treated 688 in-patients and nearly 1800 new out-patients during the year. Owing to the serious nature of the operations performed at this hospital a convalescent home is greatly needed, so that beds can be evacuated more quickly.**

NEW OUT-PATIENT DEPARTMENT AT THE ROYAL INFIRMARY, WIGAN.—**A memorial to the late King Edward, taking the form of a new out-patient department, was opened at the Royal Albert Edward Infirmary, Wigan, on Feb. 1st, by the Earl of Crawford and Balcarres, who, in an interesting speech on the progress of medical science, said that the success which the medical profession had achieved during the war was far in excess of anything that could have been predicted ten or even five years ago. The addition to the infirmary has been built at a cost of over £12,000, and represents the last of a series of extensions and enlargements which have been made at intervals since the foundation of the institution 40 years ago. As the new buildings were not begun till the beginning of the war their completion free from debt is an achievement of which Wigan may be proud.**

The War.

THE CASUALTY LIST.

THE following names of medical officers appear among the casualties announced since our last issue :—

Died.

Major V. H. Symons, R.A.M.C., was educated at Birmingham University, and qualified in 1901. He had held appointments at the General Hospital, Birmingham, and in South Africa and Australia, and died at the Military Hospital, Tidworth, from an illness contracted in France.

Major W. Wiley, R.A.M.C., was educated at Trinity College, Dublin, and qualified in 1903. After holding a house appointment at the Staffordshire General Hospital, he joined the R.A.M.C. in 1904.

Dr. Isobel A. Tate, who died whilst on duty at the Military Hospital, Malta, received her medical education at Belfast and at Dublin, qualifying in 1899, and had held several public appointments. Dr. Tate was acting as senior surgeon to Mrs. Stobart's medical unit in Serbia, but contracted typhoid fever and was invalided home just prior to the historical Serbian retreat.

Wounded.

Capt. J. A. C. Scott, R.A.M.C., attached Durham Light Infantry.

Capt. J. M. Young, R.A.M.C., attached Highland Light Infantry.

Capt. W. S. Evans, R.A.M.C., attached Royal Welsh Fusiliers.

Lieut. R. A. Slater, R.A.M.C., attached Royal Field Artillery.

OBITUARY OF THE WAR.

HAMILTON MATHEWSON, M.B., B.CH. BELF.

CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Temporary Captain H. Mathewson, who was killed on active service in November last, was 24 years of age and was the seventh son of the late Andrew Mathewson, Dunbunraver House, Newtownstewart, co. Tyrone. He received his medical education at Queen's University, Belfast, graduating M.B., B.Ch., B.A.O. in 1910. In the same year he was appointed senior assistant at the Portsmouth Infirmary, and two years later resident medical officer to the Norwich Infirmary, with care of the Children's Homes, Norwich. He was about to take the surgical Fellowship of the Scottish Royal Colleges in March, 1915, when he obtained a commission in the R.A.M.C. and went to France. He was slightly wounded in September last, remaining, however, on duty, and on Oct. 23rd was dangerously wounded by a sniper as he was attending to a wounded man in front of the lines, and died four days later.

A colleague at the Norwich Infirmary writes of Captain Mathewson as an excellent organiser and possessing marked surgical ability, coupled with a quiet and unassuming manner which made him popular with the staff and governors.

DEATHS AMONG THE SONS OF MEDICAL MEN.

The following sons of medical men must be added to our lists of those who have fallen during the war :—

Capt. B. J. C. Dudley, Dorsetshire Regiment, attached Nigeria Regiment, third son of Brigade-Surgeon Lieut.-Col. W. E. Dudley, of Bath.

Capt. A. Lord, Welsh Regiment, eldest son of Dr. R. E. Lord, of Colwyn Bay.

THE HONOURS LIST.

The following awards to medical officers are announced :—

Distinguished Service Order.

Major John Edward Briscoe, S. African M.C.
For conspicuous gallantry and devotion to duty. Although himself wounded, he continued to tend wounded men under very heavy fire. He set a splendid example of courage and coolness throughout.

Bar to Military Cross.

Temp. Capt. Kenneth William Mackenzie, M.C., R.A.M.C.
For conspicuous gallantry and devotion to duty. He displayed great courage and determination in conducting a hazardous and very difficult enterprise for the rescue of wounded from dug-outs in the newly-captured enemy trenches. He set a splendid example throughout.

(The award of the Military Cross was recorded in THE LANCET of Nov. 4th, 1916, p. 770.)

Military Cross.

Temp. Lieut. James Lang Cochrane, R.A.M.C., attached Gloucester Regiment.
For conspicuous gallantry and devotion to duty. He displayed great courage and determination in tending the wounded under heavy fire. He has on many previous occasions done fine work.

Captain Arthur George Fisher, R.A.M.C., Special Reserve.
For conspicuous gallantry and devotion to duty. He went forward to the front line under very heavy fire to locate some wounded men, whom he later succeeded in rescuing. He had previously done fine work.

Capt. John Valentine Macdonald, I.M.S., attached Indian Army.
For conspicuous gallantry and devotion to duty. He displayed great courage and determination in attending to the wounded under very heavy fire. He had previously done fine work.

Temp. Capt. Arthur John Rushton O'Brien, A.M.S., attached Gold Coast Regiment.
For conspicuous gallantry and devotion to duty. He repeatedly dressed and tended wounded men under very heavy fire. He set a splendid example of courage and coolness throughout.

Temp. Capt. James Edmund Rutherford, R.A.M.C., attached Royal Irish Regiment.
For conspicuous gallantry and devotion to duty. He displayed great courage and determination in dressing the wounded under very heavy fire. He has on many previous occasions done fine work.

Temp. Lieut. John Black Stevenson, R.A.M.C., attached Liverpool Regiment.
For conspicuous gallantry and devotion to duty. On four separate occasions he personally conducted stretcher-bearers through very heavy fire to succour wounded men, later, although himself wounded, he continued to carry on his work.

Temp. Capt. Roger Llewellyn Williams, R.A.M.C., attached S. Staffs Regiment.
For conspicuous gallantry and devotion to duty. He displayed marked courage and determination in tending the wounded under very heavy fire. He has on many previous occasions done fine work.

Capt. Kenneth Alexander Gilchrist, S. African M.C.
For conspicuous gallantry and devotion to duty. He displayed great courage and determination in tending the wounded under very heavy fire. He set a fine example to those about him.

MENTIONED IN DESPATCHES.

The names of the following medical officers are included in a despatch, dated Nov. 22nd, 1916, received from Lieut.-General the Hon. J. C. Smuts, Commander-in-Chief of the East African Forces :—

Royal Navy.—Temp. Surg. A. F. R. Woollaston.

Staff, Headquarters, &c.—Maj. G. D. Maynard, S. Afr. Med. Corps; Lt.-Col. H. W. Vaughan-Williams, S. Afr. Med. Corps; Lt.-Col. J. H. Whitehead, S. Afr. Med. Corps.

Royal Army Medical Corps.—Capt. (temp. Maj.) J. A. Manifold; Temp. Capt. E. A. Gates.

South African Medical Corps.—Lt.-Col. T. Smyth; Lt.-Col. W. V. Field; Maj. J. E. Briscoe; Maj. H. S. Flook; Temp. Maj. J. Hunter; Maj. R. M. Truter; Maj. R. L. Girdwood; Maj. J. W. de Vos; Maj. C. M. Brothers (Dental Unit); Capt. (temp. Maj.) H. J. Orford; Capt. M. Heyns; Temp. Capt. K. A. Gilchrist; Capt. A. Groenewald, M.C.; Capt. N. J. Hofmeyr.

Indian Medical Service.—Maj. (temp. Lieut.-Col.) F. W. Sumner; Maj. E. T. Harris; Maj. A. Cameron; Maj. W. S. McGillivray; Capt. O. A. R. Berkeley-Hill; Capt. A. E. Grisewood; Capt. J. V. MacDonald.

East African Medical Service.—Capt. (temp. Maj.) A. D. J. B. Williams; Capt. A. A. H. Lawrence; Capt. J. C. Watt.

Uganda Medical Service.—Lieut.-Col. A. D. P. Hodges, C.M.G.; Temp. Maj. H. B. Owen.

West African Medical Service.—Temp. Capt. A. J. R. O'Brien.

STAR AND GARTER HOME, RICHMOND.—On Feb. 10th the Queen, on behalf of the British Red Cross Society, received the deeds of the land and building of the Star and Garter Home, together with those of Ancaster House, Richmond, an adjunct to the Home. Her Majesty also received £13,500 towards the endowment fund in addition to £18,000 the result of a collection among school children for a memorial to Jack Cornwell, V.C. This money will be used for the endowment of beds in the Home.

THE CENTRAL MEDICAL WAR COMMITTEE.

The Central Medical War Committee, which sat for two days last week hearing appeals from the decisions of various Local Committees, pursued the same course this week. As had been expected, the appeals have grown steadily more numerous as the medical profession becomes thinned for military or naval purposes. Most of the medical men who were obviously free to take commissions have taken them, while a large number whom it is now sought to recruit can supply definite arguments for exemption. And it must be remembered that a certain proportion of them will later be rejected on physical grounds.

On Wednesday last the important piece of business before the Committee was the discussion of the actions taken, and to be taken, in accordance with the statement of the Director-General of National Service published in THE LANCET last week. Mr. Chamberlain, it will be remembered, said that it would be necessary "to see that the doctors are so mobilised and distributed that the needs of both the civil population and the Army can be met." It was reported at the meeting that an interview had taken place between certain members of the Central Medical War Committee and the Director-General of National Service on the subject of mobilisation of the medical profession as suggested by him in his general statement of his intentions. Mr. Chamberlain is now considering the terms of a communication laying the whole matter before members of the medical profession, and appealing to them to volunteer their services. It was felt by the Central Medical War Committee that the work which would fall upon it, should it receive a mandate to add to its previous activities others connected with the proposed general mobilisation of the profession, would necessitate addition to its central staff, and an interesting debate took place on the increase of the personnel of this staff. The great advantage which would result from strengthening the position of the Local Medical War Committees was insisted upon. There was a general feeling in the Committee that these local bodies were not always, or, perhaps, as a rule, used to the greatest advantage by the War Office, and that the War Office would greatly assist in the work of fair and adequate recruiting to meet the military needs of the country by ensuring that the medical military authorities in the various Commands at home should always be in close touch with the Local Medical War Committees for the districts within the area of each Command.

BOOKS FOR BRITISH PRISONERS OF WAR.

The British Prisoners of War Book Scheme is the officially recognised medium for providing British prisoners of war with books for purposes of serious study. Those responsible for the working of the scheme are making urgent appeal for works on medical subjects to meet actual requests received from British prisoners, soldiers, sailors, and civilians, interned in enemy or neutral countries. Among the special books asked for at the moment are the following: "Diseases of Women" (Galabin), "Diseases of Children" (Goodheart and Still), "Materia Medica and Therapeutics" (Mitchell Bruce), "Medicine" (Osler), "Pharmacology" (Boumetz). All who can contribute one or more of the above works to this excellent War Charity are invited to forward to Mr. A. T. Davies, at the Board of Education, Whitehall, London, S.W., a list of the books they can offer. They will then be notified as to the acceptance of their gifts. Further particulars of the Book Scheme may be had on application.

ARMY CANTEENS.—The Army Canteens Committee has now assumed control of 1000 out of a total 1700 canteens in military barracks and camps, and negotiations are pending in regard to the remainder. Under the Committee's management the soldier will be the sole shareholder and 10 per cent. of the takings will be earmarked as an interim dividend for the canteen customers. Surplus profits are credited to the Central Regimental Institutes Fund from which £100,000 have already been given to the Star and Garter Hospital. The total annual turnover of the canteens at home is stated to be more than £15,000,000.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

The Parliamentary Session and the War.

Parliament met on Wednesday, Feb. 7th. It is devoting itself almost exclusively to the war and the problems arising out of it. The House of Commons has discussed various matters affecting the food-supply. A vote of credit of £550,000,000 has been granted in Committee of Supply, which it is expected will carry on the war until the end of May. The Chancellor of the Exchequer's statement revealed the fact that expenditure had now reached an average of £5,790,000 a day. He placed the expenditure from the beginning of the war at £4,200,000,000.

Criminal Law Amendment Bill.

Sir GEORGE CAVE, the Home Secretary, has given notice that at an early date he will introduce in the House of Commons a Bill "to make further provision with respect to the punishment of sexual offences and the prevention of indecent advertisements and matters connected therewith." It is stated that one of the provisions of the Bill will make the communication knowingly of venereal disease a criminal offence. The expectation is entertained that the Local Government Board will bring forward a Bill at a later day to suppress the treatment of venereal disease by quacks and "secret remedies."

Army Medical Boards.

On the House of Commons going into Committee of Supply on Army Estimates, Mr. NIELD will call attention to the action of medical boards in passing recruits for service. He proposes to move "that, in the opinion of this House, the classification of recruits for the Army by military medical boards, particularly of men who have been previously examined upon attestation under the Derby scheme and rejected as unfit, has been productive of great and unnecessary hardship as well as expense by reason of the large number of such men, while undergoing training, being found unable to perform the military work required of them in the class to which they have been assigned, whereby they have had to be sent for hospital treatment and have occupied accommodation and medical attendance urgently required for returned wounded men; and this House is of opinion that an inquiry is urgently needed to alter and standardise these medical examinations and to ascertain the extent to which hospital accommodation and expense have been expended which with proper care might have been avoided."

HOUSE OF COMMONS.

MONDAY, FEB. 12TH.

Wounded Prisoners in Switzerland.

Mr. HUME WILLIAMS asked the Foreign Secretary what was the present state of the negotiations with Germany with reference to the mutual repatriation of prisoners interned in Switzerland; whether there was any hope that badly wounded prisoners would be exchanged; and, if so, when they might be expected to arrive home.—Mr. J. F. HOPE (for the Foreign Secretary) answered: The German Government have not yet definitely accepted our proposal for the repatriation from Switzerland of prisoners of war with disabilities which have developed since their transfer to Switzerland.

British Prisoners in Turkey.

Answering Mr. HUME WILLIAMS, Mr. J. F. HOPE said: His Majesty's Government has repeatedly made the strongest possible representations to the Turkish Government with a view to obtaining permission for representatives of the United States Embassy to visit the camps where British prisoners of war are interned. Their efforts until now have been unsuccessful, but they are being and will be continued. In the meantime certain camps have been visited by delegates of the International Committee of the Red Cross, whose report has not yet been received. The information which has been reaching His Majesty's Government from diverse sources is to the effect that the conditions under which the officer prisoners of war are interned are tolerable, but the situation of the prisoners of other ranks is in general deplorable.

TUESDAY, FEB. 13TH.

"Manipulative" Surgery.

In answer to a question whether some of the leading exponents of "manipulative surgery" had offered to give their services free to suffering soldiers and their offers had been rejected, Mr. MACPHERSON (Under Secretary for War) said that the rule was quite clear. Any man who was not on the Medical Register was not eligible for the Royal Army Medical Corps. The care, attention, and skill which had

been bestowed by members of the latter on men of the Army had been received with approbation on all hands.

Tuberculosis Treatment of Naval Officers.

Answering Mr. BRUNNER, Sir EDWARD CARSON (First Lord of the Admiralty) said: Naval officers who are admitted into hospital with pulmonary tuberculosis contracted on service are treated in a naval hospital at the expense of the Admiralty, unless they wish to be treated in an outside institution, when they have to undertake their own cure and treatment and the expense of such treatment. They are not invalided after 91 days' treatment, but at the expiration of this period their full pay ceases and they are put on half-pay. These regulations have recently been brought to my notice, and in my opinion are not satisfactory, and the question of an alteration in the regulations affecting the care and maintenance of these cases is now before the Board.

Appointments.

Successful applicants for vacancies, Secretaries of Public Institutions, and others possessing information suitable for this column, are invited to forward to THE LANCET Office, directed to the Sub-Editor, not later than 9 o'clock on the Thursday morning of each week, such information for gratuitous publication.

IRWIN, S. (temp. Capt., R.A.M.C.), and LOWRY, C. G. (temp. Capt., R.A.M.C.), have been appointed Assistant Surgeons to the Limbless Hospital, Belfast.

STEELE, PATRICK, M.D. Edin., Medical Superintendent of Roxburgh District Asylum.

Certifying Surgeons under the Factory and Workshops Acts: ELLISON, H. B., M.R.C.S., L.R.C.P. Lond. (Frodsham, Cheshire); JONES, T., M.R.C.S., L.R.C.P. Lond. (Amlwch, Anglesey); and KNOX, J. E., M.B., C.M. Edin. (Esher, Surrey).

Vacancies.

For further information regarding each vacancy reference should be made to the advertisement (see Index).
When the application of a Belgian medical man would be considered the advertisers are requested to communicate with the Editor.

APPLECROSS, PARISH OF ROSS-SHIRE.—Medical Officer, &c., for Torridon District. Estimated emoluments £350 per annum.

ASHTON-UNDER-LYNE, LANCS, DISTRICT INFIRMARY AND CHILDREN'S HOSPITAL.—Assistant House Surgeon. Salary £160 per annum, with usual emoluments.

BIRKENHEAD UNION INFIRMARY.—Junior Female Resident Assistant Medical Officer. Salary at rate of £300 per annum, with board, &c.

BOLTON INFIRMARY AND DISPENSARY.—Senior House Surgeon, Second House Surgeon, and also Third House Surgeon. Salaries £230, £200, and £180 per annum respectively, with board, &c.

BOURNEMOUTH ROYAL VICTORIA AND WEST HANTS HOSPITAL.—Resident Medical Officer. Salary £250 per annum, with board, &c.

BRITISH RED CROSS HOSPITAL, Netley.—Two Medical Officers and One Surgeon.

BURY INFIRMARY.—Junior House Surgeon. Salary £150 per annum, with board, &c.

CARDIFF, KING EDWARD VII.'s HOSPITAL.—House Surgeon for six months.

DERBYSHIRE ROYAL INFIRMARY, Derby.—House Physician and Casualty Officer. Also Resident Anæsthetist. Salaries £200 per annum, with board, &c.

DORCHESTER, DORSET COUNTY COUNCIL.—Temporary Clinical Tuberculosis Officer. Salary £350 per annum.

DUNDEE DISTRICT ASYLUM.—Assistant Resident Medical Officer. Salary £300 per annum, with board, &c.

DUNDEE MATERNITY AND CHILD WELFARE SCHEME.—Medical Practitioner (Female). Salary £350 per annum.

EDINBURGH PARISH COUNCIL, CRAIGLOCKHART POORHOUSE AND HOSPITAL.—Assistant Medical Officer. Salary £250 per annum, with board, &c.

EVELINA HOSPITAL FOR CHILDREN, Southwark, S.E.—House Physician. Salary at rate of £160 per annum, with board, &c.

GREAT YARMOUTH HOSPITAL.—House Surgeon, unmarried. Salary £200 per annum, with board, &c.

GUILDFORD, ROYAL SURREY COUNTY HOSPITAL.—House Surgeon. Salary £200 per annum, with board, &c.

HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, Brompton.—House Physician for six months. Salary 30 guineas.

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.—House Surgeon and Assistant Casualty Medical Officer. Salary at rate of £80 per annum, with board, &c.

KENSINGTON BOARD OF GUARDIANS INSTITUTION, Marloes-road.—Second Assistant Resident Medical Officer. Salary £160 per annum, with board, &c.

LEEDS PUBLIC DISPENSARY.—Resident Medical Officer. Salary £200 per annum, with board, &c.

MANCHESTER, BAGULEY SANATORIUM FOR TUBERCULOSIS.—First Assistant Medical Officer, unmarried. Salary £300 per annum, with board, &c.

MANCHESTER COUNTY ASYLUM, Prestwich.—Locum Tenens. Salary £7 7s. per week, with board, &c.

MANCHESTER NORTHERN HOSPITAL FOR WOMEN AND CHILDREN, Parkplace, Cheetham Hill-road.—Female House Surgeon. Salary £120 per annum, with board, &c.

MANCHESTER UNION, NELL LANE MILITARY HOSPITAL, West Didsbury.—Locum Assistant Resident Medical Officer. Salary £7 7s. per week, with board, &c.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC, Queen-square, Bloomsbury.—Junior House Physician. Salary £150 per annum, with board, &c.

PORTSMOUTH ROYAL HOSPITAL.—House Surgeon for six months. Salary £250 per annum, with board, &c.

QUEEN CHARLOTTE'S LYING-IN HOSPITAL, Marylebone-road, N.W.—Assistant Resident Medical Officer for four months. Salary at rate of £60 per annum, with board, &c.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford.—House Surgeon.

ROYAL FREE HOSPITAL, Gray's Inn-road, W.C.—Female Junior Obstetric Assistant. Salary £62 10s. per annum, with board, &c. Also to attend at Endsleigh-street Maternity Hospital. Salary £40 per annum.

ROYAL LONDON OPHTHALMIC HOSPITAL, City-road, E.C.—Third House Surgeon. Salary at rate of £50 per annum, with board, &c.

ST. MARK'S HOSPITAL, City-road, E.C.—House Surgeon. Salary as arranged, with board, &c.

ST. PETER'S HOSPITAL FOR STONE, &c., Henrietta-street, Covent Garden, W.C.—Junior House Surgeon for six months. Salary at rate of £75 per annum, with board, &c.

SALFORD ROYAL HOSPITAL.—House Surgeon and Junior House Surgeon. Salaries at rate of £200 and £150 per annum respectively, with board, &c.

STAFFORDSHIRE EDUCATION COMMITTEE.—Female Assistant School Medical Inspectors. Salaries at rate of £400 per annum.

SUNDERLAND ROYAL INFIRMARY.—Female House Surgeon. Salary £150 per annum, with board, &c.

UNIVERSITY OF LONDON.—External Examiners.

VICTORIA HOSPITAL FOR CHILDREN, Tite-street, Chelsea, S.W.—Senior Resident Medical Officer. Salary £250 per annum, with board, &c.

WILLESDEN URBAN DISTRICT COUNCIL.—Temporary Assistant Medical Officer for the Health Department. Salary £8 8s. per week.

WINCHESTER, ROYAL HAMPSHIRE COUNTY HOSPITAL.—Resident Medical Officer. Salary as arranged, with board, &c.

THE Chief Inspector of Factories, Home Office, London, S.W., gives notice of vacancies for Certifying Surgeons under the Factory and Workshop Acts at Harefield and Rickmansworth.

Births, Marriages, and Deaths.

BIRTHS.

BLACKSTONE.—On Feb. 11th, at Westcliff-on-Sea, the wife of Leonard C. Blackstone, M.B., B.S., Temporary Lieutenant R.A.M.C., of a daughter.

CLARKE.—On Feb. 4th, at Bolingbroke-grove, Wandsworth Common, the wife of Alexander Clarke, M.R.C.S., L.R.C.P., of a son.

MCGILLYCUDDY.—On Feb. 4th, at Compton-road, Wimbledon, S.W., the wife (*née* Lukey) of Captain R. H. McGillycuddy, M.C., R.A.M.C., of a son.

MURRAY-SHIRREFF.—On Feb. 9th, at Whitley Cottage, Melksham, the wife of Cecil Murray-Shirreff, L.D.S. R.C.S. Eng., of a daughter.

RIVETT.—On Feb. 10th, at a Nursing Home, to Louis Carnac Rivett, M.C., F.R.C.S., Clover Lodge, Dilke-street, Chelsea, and Mary (*née* Rowan)—a son.

STIELL.—On Feb. 10th, at Crescent-grove, Clapham, to Ruth, wife of Gavin Stiell, M.R.C.S., L.R.C.P., Temporary Captain R.A.M.C.—a daughter.

SUCKLING.—On Feb. 13th, at 5, Marine terrace, Margate, the wife of J. Jerome Suckling, M.B., B.S. Lond., of a daughter.

TINKER.—On Feb. 6th, at Barmoor, Bletchingley, Surrey, the wife of F. Stanley Tinker, M.B., of a daughter.

MARRIAGES.

BARKER–DAVIES.—On Nov. 4th, 1916, at St. Mary's Church, Quetta, Baluchistan, Captain H. L. Barker, I.M.S., to Jessie Gwladys, daughter of the late Daniel Davies, Cardigan, Wales.

MCCREADY WORKMAN.—On Feb. 7th, at Downahill United Free Church, Glasgow, Captain Wiclif McCready, R.A.M.C., to Nellie B. Workman, youngest daughter of Mr. and Mrs. W. S. Workman, of University gardens, Glasgow.

TOWERS—HAKE.—On Feb. 10th, at St. Thomas's Church, Edinburgh, Arthur Henry Towers, M.B., Ch.B., to Rita, only daughter of G. A. Hake, Lloyd's Register of Shipping, and Mrs. Hake, Leith.

YOUNG—BROUGH.—On Feb. 10th, at Holy Trinity Church, Southport, Captain William Francis Young, R.A.M.C., to Elsie Craig, youngest daughter of William Nelson Brough, of Liverpool and Southport.

DEATHS.

HUTTON.—On Feb. 10th, at Weydown, Haslemere, H. R. Hutton, M.B. Cantab., aged 63 years.

KEATES.—On Feb. 7th, Courtnay Cooper Keates, late Captain, R.A.M.C., aged 32 years.

SETON.—On Feb. 8th, at Onslow-road, Richmond, David Elphinstone Seton, M.D., in his 90th year.

SHEARER.—At Bridge of Allan, N.B., on Feb. 6th, Colonel Johnston Shearer, C.B., D.S.O., Indian Medical Service (retired), 10, Royal-terrace, Queen's Park, Glasgow.

WOOD.—On Feb. 8th, at Dunbar, Russell Elliott Wood, M.B., C.M., F.R.C.S.E., Lieutenant-Colonel, R.A.M.C., Yeomanry, aged 62 years.

Mr. Percival Turner, of 4, Adam-street, Strand, regrets to announce the death, on Wednesday, Feb. 14th, of Miss Page, his trusted secretary, who was well known to his clients for over 21 years.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Short Comments, and Answers to Correspondents.

THE INVENTOR OF QUICK-FIRING GUNS.

IT must be more or less an accident that we have not got in early English surgery ample accounts of gun-shot wounds. The quick-firing hand gun seems to be such a modern invention that it is curious to find that it is really 400 years old and that a King of England so closely connected with medical men as Henry VIII. should have been interested in the invention. In the little-known "Chroniques des Iles de Jersey, Guernsey, Aureguy et Serk," it is related how—

Hellier De Carteret, Bailly de la dite Isle de Jersey, se transporta vers le Roy Henry VIII., auquel il remonstra le grief et injure que le dit Sire Hugh Vaughan, Capitaine de la dite Isle, luy avoit faite en Cour séante, et comment le Roy luy confirma sa patente, touchant son office de Bailly soubs le Grand Sceau d'Angleterre durant sa vie, et aussy le fist son Serviteur et Escuier tranchant, dont le dit Bailly fut sermenté solemnellement ainsy qu'en tel cas est réquis et accoutumé. Et'avecq cela le Roy donna congé et licence au dit Bailly, de tirer tant de la harquebuse que de larchaleste en quelque endroit que ce fust en tout le Royaume d'Angleterre, tant au gibier que es bestes sauvages sans aucunement en estre réprins ni destourbé d'aucun durant sa vie; et de ce, luy en fist bonne asseurance soubs son privé signe. Et fut le dit Sire Hugh Vaughan, Capitaine comme dit est, envoyé quérir par un Héreault d'armes en toute haste.

This giving by the King of a licence to use the harquebuse—the original hand-gun—was an exceptional privilege, as the British archers were thought highly of and encouraged.

The next few lines relate the invention by Hellier De Carteret of a quick-firing harquebuse, which would also aim in two directions at the same time, and King Henry VIII's. interest therein. The greatest improvements in the harquebuse are generally credited to Filippo Strozzi, an Italian, in the year 1530.

Le dit Bailly estant ainsy parvenu en la faveur du Roy par le moyen des Seigneurs du Conseil, et aussy que le Roy se délectoit fort à tirer tant de larcha'este que de la harquebuse, pouvoit ordinairement aller avecq le Roy quand il alloit tirer en quelqu'un de ses Parcqs fust es bestes sauvages ou autre gibier; et mesmément pour autant que le dit Bailly avoit trouvé une invention de tirer de sa harquebuse 5 on 6 traits de boulez l'un après l'autre et à plusieurs marques toutes d'une même charge l'une avant l'autre et d'un mesme feu, et aussy de son arcba'este tirer deux vires tout d'un coups, l'une d'une voye et l'autre de l'autre et à deux marques. Le Roy voulut sçavoir et apprendre la dite invention et l'expérimenter et pratiquer luy-mesme, à quoi il y print un fort grand plaisir, tel'ement que le dit Bailly fut de plus en plus en la bonne grâce et faveur du Roy.

The wounds produced were so severe that a distilled aromatic spirituous liquor termed "harquesbusade" came into use for treating the shot wounds, and its composition was altered from time to time according to experience or fancy. The Seigneurs of St. Ouen, Jersey, have for so long a time been named De Carteret, that Philippe De Carteret who was the Seigneur in 1585 was the fifty-ninth Seigneur of St. Ouen, and the claim has been made that it would be difficult to find a race so old and direct in any kingdom.

TEASPOONFUL MEASURES OF FOODS.

To the Editor of THE LANCET.

SIR,—In these days of food shortage we are all concerned with the measures and weights of foods. I have been interesting myself in discovering how many teaspoonfuls are contained in the avoirdupois pound of the following ordinary household foods and in some cases how many pieces to the pound. I find as follows, with a teaspoon measuring 97 teaspoonfuls to the pint (not a standard drachm):—

Tea	112	teaspoonfuls to the lb.	
Cocoa	96	,, ,,	
Coffee beans	104	,, ,,	(4150 beans).
Lump sugar	80	lumps (cubes) ,,	
White granulated sugar ...	48	teaspoonfuls ,,	
Yellow crystals (moist)... ...	36	,, ,,	
Rice	48	,, ,,	
Tapioca	64	,, ,,	
Smallest haricot beans ...	48	,, ,,	(1608 beans).
Salt (very dry)	44	,, ,,	
Flour	60	,, ,,	

From the above figures some deductions may be made. For instance, one pound of tea at 2*s.* 4*d.* lb. will make 112 cups. That is exactly one farthing per cup; and with two lumps of sugar at 6*d.* lb. (13 cubes for 1*d.*) equals one-sixth of a penny; and with milk at 3*d.* a pint, three teaspoonfuls per cup equals one-tenth of a penny; total, a very small fraction over a halfpenny per cup (not including cost of gas for heating the water). It also shows that damp yellow crystal sugar (so-called "Demerara") heaps on the spoon and is not so economical as white crystals at the same price. It also shows that five lumps (cubes) equals three teaspoonfuls of granulated sugar. The pound of haricots measured a pint, and was bought at the grocer's. A pint of "butter beans" weighed only 13½ ounces, and there were 310 beans. A pound would have been 365 beans. The cost was the same—viz., 5*d.*—but the butter beans were bought at the cornchandler's, where measure and not weight is the rule. Other deductions may be made at pleasure.

I thought these measurements might interest your readers. The point to be remembered is that the exact size of the teaspoon must be arrived at first by the measure of its water contents, as a "teaspoon" is not a standardised measure.

I am Sir, yours faithfully,

London, Feb. 9th, 1917. OBSERVER.

THE SPRINGS OF THE MOTOR-CAR.

WE have received some letters from correspondents who depend upon their motors to get through their work and who are having unwonted trouble with the springs of their cars. Doubtless the present condition of the roads is not conducive to the life of any spring on any vehicle, but it is also a fact that though most owners, especially if also drivers, see to the lubrication of their engines, they rarely think of the condition of the springs. Springs are made of a certain number of laminations, the number depending on the weight of the car. As a result of their position they are exposed to a great amount of wet, with the inevitable result that rusting may set in and ultimately prevent the natural sliding movements of the leaves, so defeating the very purpose for which the springs were originally designed. The remedy is simple and thorough—it is also a troublesome one. It is to take the springs down occasionally and dismantle and grease each member separately. This operation is not generally done by any owners or drivers, with the consequence of occasional fractures and certainly less comfort in riding. "Messrs. Brown Brothers, Limited, of 15, Newman-street, London, W., have introduced spring gaiters, which cover the springs, retain grease, and ensure the constant lubrication which is essential to the action and life of this much-neglected member of the car's anatomy," writes a frequent correspondent on motoring, adding that he "is of opinion that the use of these gaiters will prevent to a great extent any trouble with springs."

A CONUNDRUM IN RATIONS.

A LIFEBOAT containing 50 souls is afloat far from land; the probabilities are that it will not be picked up, but that it can reach land at the end of 14 days. The occupants of the lifeboat comprise: 5 A.B. sailors including, as an A.B., the ship's doctor, who takes command; 10 men passengers, of whom 4 are invalid; 15 women, of whom 3 are "as strong as men"; 20 children. The provisions in the boat are as follows: one puncheon of water, one anker of rum, 400 lb. of bread, 250 lb. of meat, 75 lb. of sugar.

The doctor decides at once to ration these provisions. What scale will give him the best chance of bringing his charge to land without loss of life?

A CENTENARIAN DESCENDANT OF OLD PARR.

A RECENT issue of *The Friend* contains some interesting particulars of Sarah Ann Alexander, of Reigate, who completed her 100th year on Jan. 15th. She is the last survivor of a long-lived family of eight brothers and sisters, one of whom died at the age of 103, the ages of the others varying from 88 to 93 years. Her mother's family claimed descent from Old Parr, who died at the age of 152. The portrait of Miss Alexander, when aged 100, shows a fine type of old age. In the same paper the death is announced, at the age of 105, of Elizabeth Towell McCoy, of Bloomingdale, Indiana, another member of the Society of Friends.

EDIBLE SEAWEED.

To the Editor of THE LANCET.

SIR,—Referring to your interesting note in THE LANCET of Feb. 10th on "Edible Sea Plants," it may interest you to know that in East Anglia "samphire" is eaten; but on investigation this proves to be not the true samphire, but *Salicornia herbacea* (Chenopodeæ); it grows on the salt marshes about here, and is pickled for eating.

I am, Sir, yours faithfully,

Melton, Suffolk, Feb. 12th, 1917. JAMES R. WHITWELL.

CHILD WELFARE CHARTS.

WE have received from the secretary of the National League for Physical Education and Improvement a specimen of a very practical chart (1*s.* per dozen, 6*s.* per 100) for recording the weight of the child during the first 5 years of life. In the first year the record is weekly, in the second monthly, and in the third to fifth inclusive quarterly. The course of normal weight is indicated. Two useful wall charts are also issued (20 × 30 in., price 2*s.* post-free): one indicating the dangers of the "comforter," the other showing graphically the hours of sleep desirable at different ages. The charts should be of real help to welfare workers, and may be obtained from the offices of the National League, 4, Tavistock-square, London, W.C.

Medical Diary for the ensuing Week.

SOCIETIES.

ROYAL SOCIETY, Burlington House, London, W.

THURSDAY.—Papers:—Mr. S. A. Smith: The Fossil Human Skull found at Talgai, Queensland (communicated by Prof. G. E. Smith).—Dr. C. Chree: The Magnetic Storm of August 22nd, 1916.—Prof. W. H. Young: On the Ordinary Convergence of Restricted Fourier Series.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

MEETINGS OF SECTIONS.

Tuesday, Feb. 20th.

GENERAL MEETING OF FELLOWS, at 5 P.M.
Ballot for Election to the Fellowship.
(Names have already been circulated.)

THERAPEUTICS AND PHARMACOLOGY (Hon. Secretaries—W. Langdon Brown, Philip Hamill, J. Gordon Sharp): at 4.30 P.M.
Paper:
Dr. Stansfeld: The Principles of Treatment by Transfusion of Blood.

Wednesday, Feb. 21st.

HISTORY OF MEDICINE (Hon. Secretaries—J. D. Rolleston, Charles Singer): at 5 P.M.
Exhibition of Portraits, Books, &c. (at 4.30 P.M.).
Paper:
Dr. R. Hingston Fox: The Medical Practice of Dr. John Fothergill (1740–1780).

Friday, Feb. 23rd.

STUDY OF DISEASE IN CHILDREN (Hon. Secretaries—A. S. Blundell Bankart, E. A. Cockayne, C. P. Lapage): at 4.30 P.M.
Cases:
Dr. J. Porter Parkinson: Case for Diagnosis.
Dr. T. R. Whipham: (1) Precocious Sexual Development; (2) Fragilitas Ossium.
Pathological Specimens:
Dr. Eric Pritchard:
Dr. E. A. Cockayne: Case of Defect of Duodenum.
Short Papers:
Mr. J. S. Kellett Smith: Some Points in Lateral Curvature of the Spine.
Dr. F. Parkes Weber: Lipodystrophia Progressiva.

EPIDEMIOLOGY AND STATE MEDICINE (Hon. Secretaries—William Butler, M. Greenwood, jun.): at 8.30 P.M.
Paper:
Mr. A. W. Bacot (Lister Institute): The Louse Problem.
The discussion will be opened by Professor G. H. F. Nuttall, F.R.S

ROYAL SOCIETY OF ARTS, John-street, Adelphi, W.C.

MONDAY.—4.30 P.M., Cantor Lecture:—Prof. A. B. Pite: Town Planning and Civic Architecture. (Lecture IV.)

ILLUMINATING ENGINEERING SOCIETY, House of the Royal Society of Arts, John-street, Adelphi, W.C.
TUESDAY.—5 P.M., Dr. J. Kerr: The Effect on the Eye of Varying Degrees of Brightness and Contrast.

LONDON DERMATOLOGICAL SOCIETY, St. John's Hospital, 49, Leicester-square, W.C.

TUESDAY.—5 P.M., Paper:—Dr. C. Kempster: The Action of X Rays upon Diseases of Bacterial Origin.

ROYAL MICROSCOPICAL SOCIETY, 20, Hanover-square, W.

WEDNESDAY.—Dr. A. H. Drew and Dr. Una Griffin: Parasitology of Pyorrhœa.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East.

THURSDAY.—5 P.M., Milroy Lectures:—Dr. W. J. Howarth: Meat Inspection, with Special Reference to the Developments of Recent Years. (Lecture I.)

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.

MONDAY AND WEDNESDAY.—5 P.M., Hunterian Lectures:—Prof. R. H. Elliot: Couching for Cataract in India.

POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.

MONDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye. Dr. Simson: Diseases of Women.
TUESDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.
WEDNESDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.
THURSDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye.
FRIDAY.—10 A.M., Dr. Simson: Gynæcological Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.
SATURDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. Mr. B. Harman: Eye Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, 49, Leicester-square, W.C.

THURSDAY.—6 P.M., Chesterfield Lecture:—Dr. M. Dockrell: The Papular Eruptions.

ROYAL INSTITUTION OF GREAT BRITAIN, Albemarle-street, Piccadilly, W

TUESDAY.—3 P.M., Prof. C. S. Sherrington: Pain and its Nervous Basis. (Lecture VI.)

ROYAL INSTITUTE OF PUBLIC HEALTH, Lecture Hall of the Institute, 37, Russell-square, W.C.

Course of Lectures and Discussions on Public Health Problems under War and After-war Conditions:—
WEDNESDAY.—4 P.M., Lecture VI.:—Dr. T. D. Lister: The Tuberculosis Problem in War Time. Dr. T. D. Acland, Dr. T. N. Kelynack, and Dr. C. Wall have promised to take part in the discussion.

EDITORIAL NOTICES.

IT is most important that communications relating to the Editorial business of THE LANCET should be addressed *exclusively* "TO THE EDITOR," and not in any case to any gentleman who may be supposed to be connected with the Editorial staff. It is urgently necessary that attention should be given to this notice.

It is especially requested that early intelligence of local events having a medical interest, or which it is desirable to bring under the notice of the profession, may be sent direct to this office.

Lectures, original articles, and reports should be written on one side of the paper only, *and when accompanied by blocks it is requested that the name of the author, and if possible of the article, should be written on the blocks to facilitate identification.*

We cannot prescribe or recommend practitioners.

Letters, whether intended for insertion or for private information, must be authenticated by the names and addresses of their writers—not necessarily for publication.

Offices: 423, STRAND, LONDON, W.C.

MANAGER'S NOTICES.

VOLUMES AND CASES.

VOLUMES for the second half of the year 1916 will be ready shortly. Bound in cloth, gilt lettered, price 16*s.*, carriage extra.

Cases for binding the half-year's numbers (inland edition) are now ready. Cloth, gilt lettered, price 2*s.*, by post 2*s.* 4*d.*

To be obtained on application to the Manager, accompanied by remittance.

ALTERATION IN THE PRICE OF "THE LANCET."

INCREASED war expenses and cost of production necessitate an increase of the price of THE LANCET. Commencing with the new year, the price was raised to 8*d.* The rates of subscription remain as revised in October.

INLAND.

One Year	£1 10 0
Six Months	0 16 0
Three Months	0 8 0

COLONIES and ABROAD.

One Year	£1 12 6
Six Months	0 17 6
Three Months	0 8 9

Subscriptions (which may commence at any time) are payable in advance. Cheques and Post Office Orders (crossed "London County and Westminster Bank, Covent Garden Branch") should be made payable to the Manager, Mr. CHARLES GOOD, THE LANCET Offices, 423, Strand, London, W.C.

TO SUBSCRIBERS.

WILL Subscribers please note that only those subscriptions which are sent direct to the Proprietors of THE LANCET at their Offices, 423, Strand, London, W.C., are dealt with by them? Subscriptions paid to London or to local newsagents (with none of whom have the Proprietors any connexion whatever) do not reach THE LANCET Offices, and consequently inquiries concerning missing copies, &c., should be sent to the Agent to whom the subscription is paid, and *not* to THE LANCET Offices.

Subscribers, by sending their subscriptions direct to THE LANCET Offices, will ensure regularity in the despatch of their Journals and an earlier delivery than the majority of Agents are able to effect.

THE COLONIAL AND FOREIGN EDITION is published in time to catch the weekly Friday mails to all parts of the world.

ADVERTISEMENT RATES.

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Five lines and under ... ... 4*s.* 0*d.*
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Quarter Page, £1 10*s.* Half a Page, £2 15*s.*
Entire Page, £5 5*s.*
Special terms for Position Pages.

Advertisements (to ensure insertion the same week) should be delivered at the Office not later than Wednesday, accompanied by a remittance.

METEOROLOGICAL READINGS.

(Taken daily at 8.30 a.m. by Steward's Instruments.)

THE LANCET Office, Feb. 14th, 1917.

Date.	Rainfall.	Solar Radio in Vacuo.	Maximum Temp. Shade.	Min. Tem.	Wet Bulb.	Dry Bulb.	Remarks.
Feb. 8	...	57	36	24	28	28	Fine
,, 9	...	59	39	25	27	27	Fine
,, 10	...	44	37	27	33	34	Fine
,, 11	...	45	38	34	34	35	Overcast
,, 12	...	43	39	34	34	35	Overcast
,, 13	...	50	42	35	36	37	Overcast
,, 14	...	47	39	34	33	35	Fine

Other information which we have been accustomed to give in these "Readings" is withheld for the period of the war.

The following journals, magazines, &c., have been received:—West London Medical Journal, Journal of Laryngology, Rhinology, and Otology, Public Health, Annals of Tropical Medicine and Parasitology, Revue d'Hygiène, Canadian Medical Association Journal, Dominion Medical Monthly, New Zealand Medical Journal, Birmingham Medical Review, Canadian Practitioner and Review, Journal of Pathology and Bacteriology, Revista Clinica.

Communications, Letters, &c., have been received from—

A.—Ashton-under-Lyne District Infirmary, Sec.-Supt. of; Capt. A. S. K. Anderson; Messrs. Allen and Hanburys, Lond.; Dr. H. G. Adamson, Lond.; Capt. D. C. Aitkenhead, C.A.M.C.; Messrs. Arnold and Sons, Lond.; Mr. S. F. d'Azevedo, Foz do Douro; Mr. R. J. Albery, Lond.; Capt. A. G. Anderson, R.A.M.C., Admiralty, Medical Department, Director General of.

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